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Summaries of Japanese Reported Longline Catches of Pacific Cod and Sablefish in the Gulf of Alaska, 1978-83

by
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July 1985

**U.S. DEPARTMENT OF COMMERCE
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National Marine Fisheries Service**

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SUMMARIES OF JAPANESE REPORTED LONGLINE CATCHES OF PACIFIC
COD AND SABLEFISH IN THE GULF OF ALASKA, 1978-83

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ABSTRACT

Foreign-reported catches of Pacific cod and sablefish resulting from extensive Japanese longline fisheries in the Gulf of Alaska during the period 1978-83 are summarized on a quarterly and annual basis and presented in statistical blocks $1/2^\circ$ of latitude by 1° of longitude. Catch per unit effort and size composition data collected by U.S. observers aboard foreign fishing vessels are also included. These summaries may facilitate the development of a U.S. fishery for Pacific cod and sablefish in the central - and western Gulf of Alaska because they demonstrate general areas where Japanese longliners fished most successfully in recent years.

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INTRODUCTION

Japan, under terms of the bilateral fisheries agreement with the United States, is required to submit catch and effort data on all species that it harvests from waters under the regulation of the Magnuson Fisheries Conservation and Management Act of 1976 (MFCMA). These data are reported by statistical blocks measuring $1/2^\circ$ of latitude by 1° of longitude and become part of a foreign-reported groundfish data base maintained at the Northwest and Alaska Fisheries Center (NAWAF) in Seattle, Washington. Summaries of these commercial catch data are useful to the U.S. fishing industry because they demonstrate the most productive locations where Pacific cod, Gadus macrocephalus, and sablefish, Anoplopoma fimbria, were recently harvested by the Japanese longline fleet. This report contains quarterly and annual Japanese longline catches of Pacific cod and sablefish, catch per unit effort (CPUE), and size composition data. Limitations due to accuracy and completeness of reporting may exist; however, the data appear to be relatively sound and useful for this report.

Other documents that summarize catch data from the foreign-reported groundfish data base for the years 1964-76 and 1977-80 include Low and Akada 1978 and Wespestad et al. 1982.

The U.S. Foreign Fisheries Observer Program also collects catch, effort and size-composition information directly from foreign vessels. In the Gulf of Alaska, the percentage of Japanese longliner vessel-days with U.S. observers on board was 16 and 18% in 1978 and 1979, respectively. In 1980 coverage decreased to 6% because of a surge in longline activity in the Gulf, but it had increased to 9% by 1982 and 34% by 1983 (Wall et al. 1980, 1981, and 1982; Nelson et al. 1983; and Berger et al. 1984).

Productive fishing locations identified from observer data have been summarized for the years 1977-79 (Smith et al. 1980).

A weakness of the effort data submitted by the Japanese has been its lack of consistency. Annual data have been submitted in terms of hachi, a Japanese term referring to a relatively nonstandard piece of longline gear containing approximately 45-55 hooks, or length increments of 300 m. This factor has complicated the establishment of a standard unit of effort. Therefore, CPUE based on foreign reported data has not been included in this report. In an attempt to qualify the reported foreign longline catches of Pacific cod and sablefish in terms of CPUE, data collected by U.S. observers were summarized in terms of tons caught per 1,000 hooks, by depth and International North Pacific Fisheries Commission (INPFC) area. The mean CPUE was also presented by quarter, INPFC area, and depth interval. Average fish weight has been included in the latter summary: In some cases small sample sizes appear to influence the data and those occurrences have been footnoted.

In 1978 amendments to the MFCMA proposed by the North Pacific Fisheries Management Council (NPFMC) took effect, prohibiting foreign longlining east of longitude 140° west and closing Davidson Bank (long. 163-165° west) to all foreign longline fishing (Fig. 1).

PACIFIC COD

Prior to 1979, Pacific cod were taken only incidentally to sablefish in the foreign longline fishery. In 1978 Japanese longline interests requested and received a change in regulations to allow them to fish for Pacific cod in waters shallower than 500 m on a year-round basis in the western Gulf of Alaska as far east as longitude 157° west. The change took effect on 1 January 1979 and was followed by another in August 1979

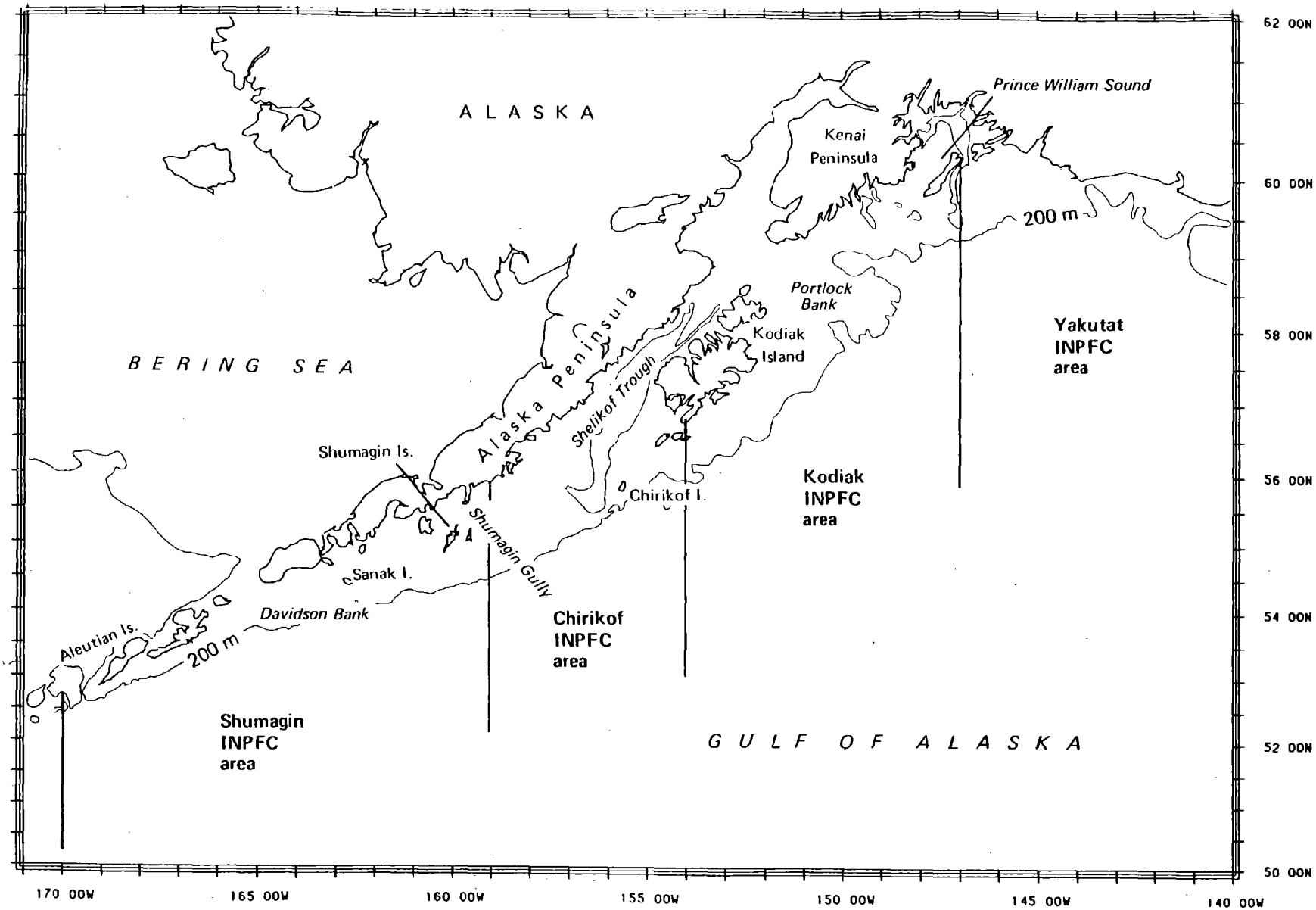


Figure 1.--Geographic locations of points or areas in the Gulf of Alaska referenced in the text.

extending that fishery eastward to longitude 140° west. The latter change in regulations permitted fishing for Pacific cod beyond **12 mi** subject to limitations imposed during the Pacific halibut, Hippoglossus stenolepis, season. The result of these changes by the NPFMC was to allow Japanese longliners to direct more longline effort to shallower water and to increase their harvest of Pacific cod. The timing of this coincided with the recruitment of the unusually large **1977** year class which had just entered the fishery (Zenger 1985). Resulting annual catches were much higher than recent historical levels as the data in Table 1 suggest. Previous all-nation catches of cod ranged from 656 metric tons (t) in **1971** to 6,507 t **in 1976**. The totals in Table 1 may not correspond precisely to those presented in the Japanese reports since the official U.S. statistics are estimated from both foreign reported data and foreign fishery observer data.

Longliners have harvested **91-92%** of the total Japanese catch of Pacific cod in the Gulf of Alaska since **1979** and about 75% of the total Gulf-wide catch of Pacific cod in recent years (Table 1). As a result the information contained in the following catch distribution maps represents the vast majority of reported Japanese catches.

The series of maps in Figure 2 contain quarterly and annual total catches of Pacific cod in metric tons (t), for each 1/2° latitude by **1°** longitude statistical block where catches were reported.

In **1978** Japanese longliners targeting Pacific cod in less than 500 m were restricted to the area west of longitude 157° west. The most productive area was the lower end of Shumagin Gully during the fourth quarter of the year. After a relatively slow start in the first 9 mo of **1979**, catches rose in the last quarter. Once again of particular importance

Table 1.--Reported total catch and Japanese longline catch of Pacific cod in the Gulf of Alaska, 1978-83.

Year	Total all-nation catch (t)	Japanese longline catch (t)	Percent of total cod catch
1978	12,160	6,800	56
1979	14,869	9,545	64
1980	35,439	27,771	78
1981	36,086	25,274	70
1982	29,379	22,499	77
1983	36,402	26,642	73

Source : Data condensed from Zenger (1985).

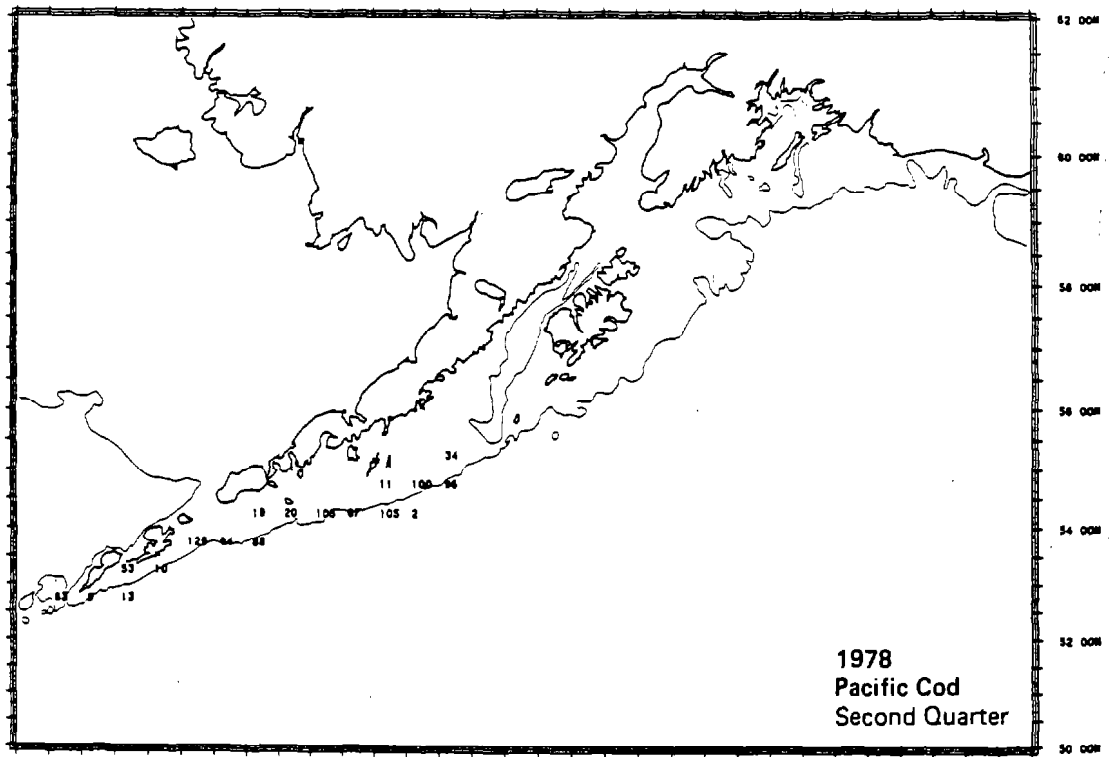
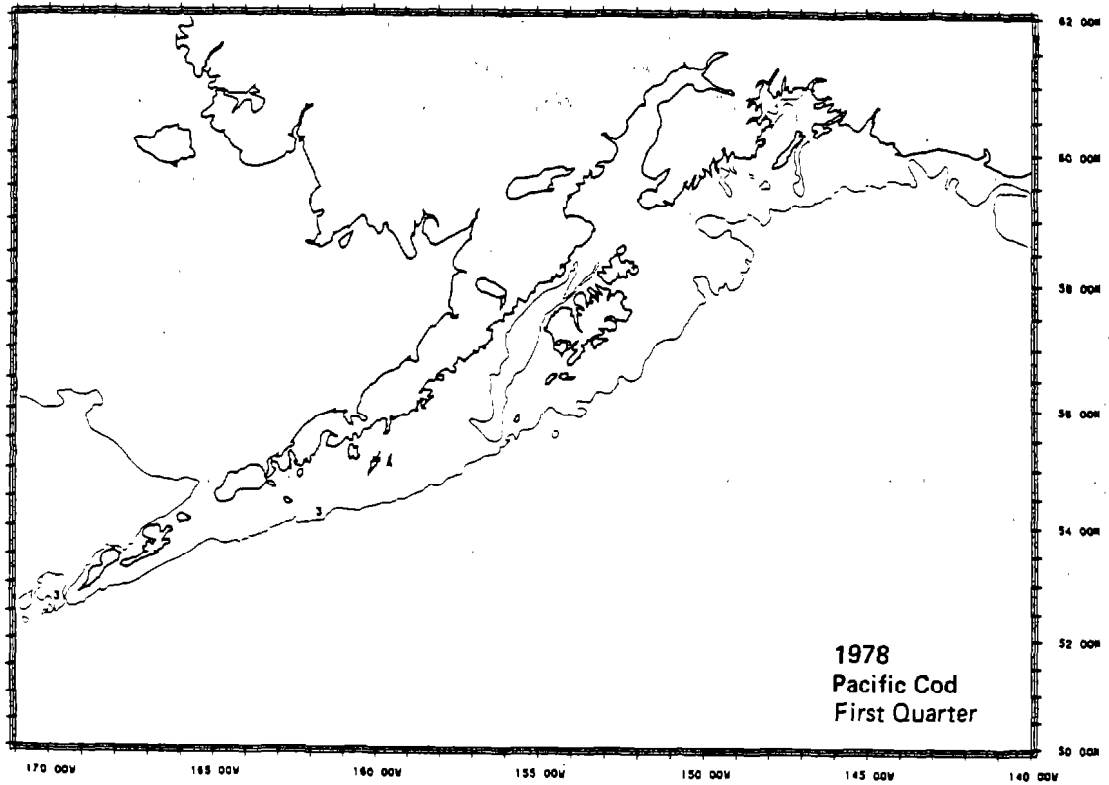


Figure 2.--Quarterly and annual Japanese longline catches (metric tons) of Pacific cod distributed in statistical blocks, 1/2° of latitude by 1° of longitude, 1978-83.

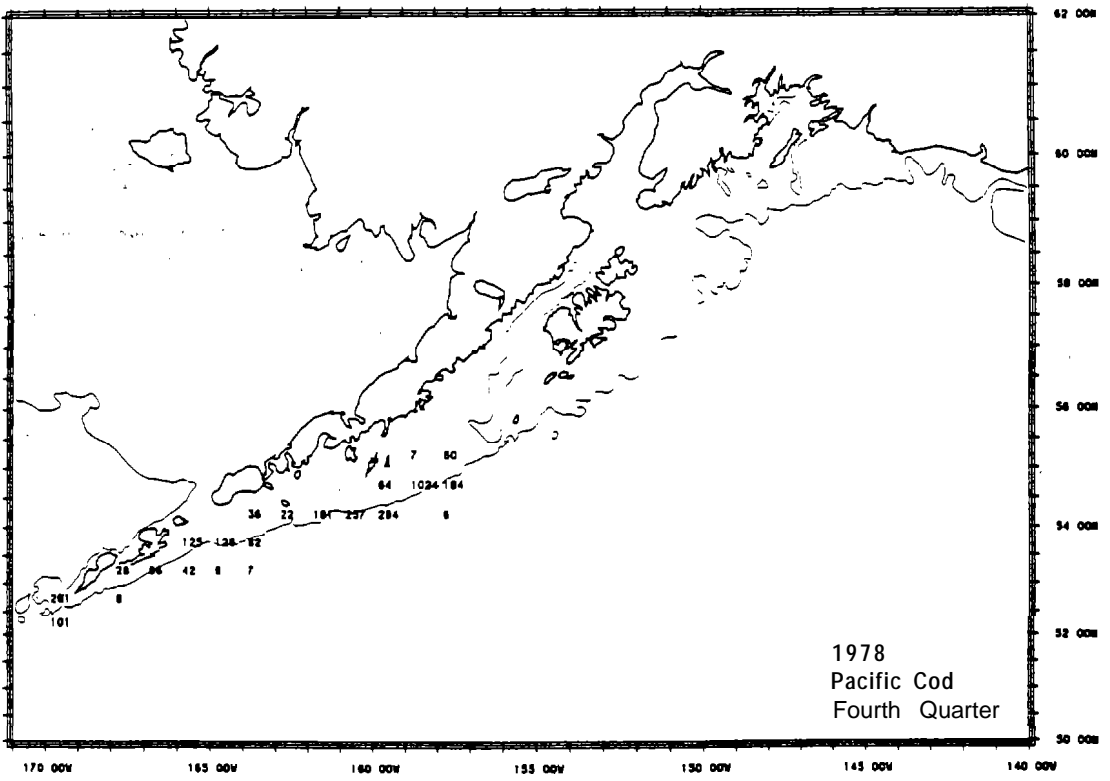
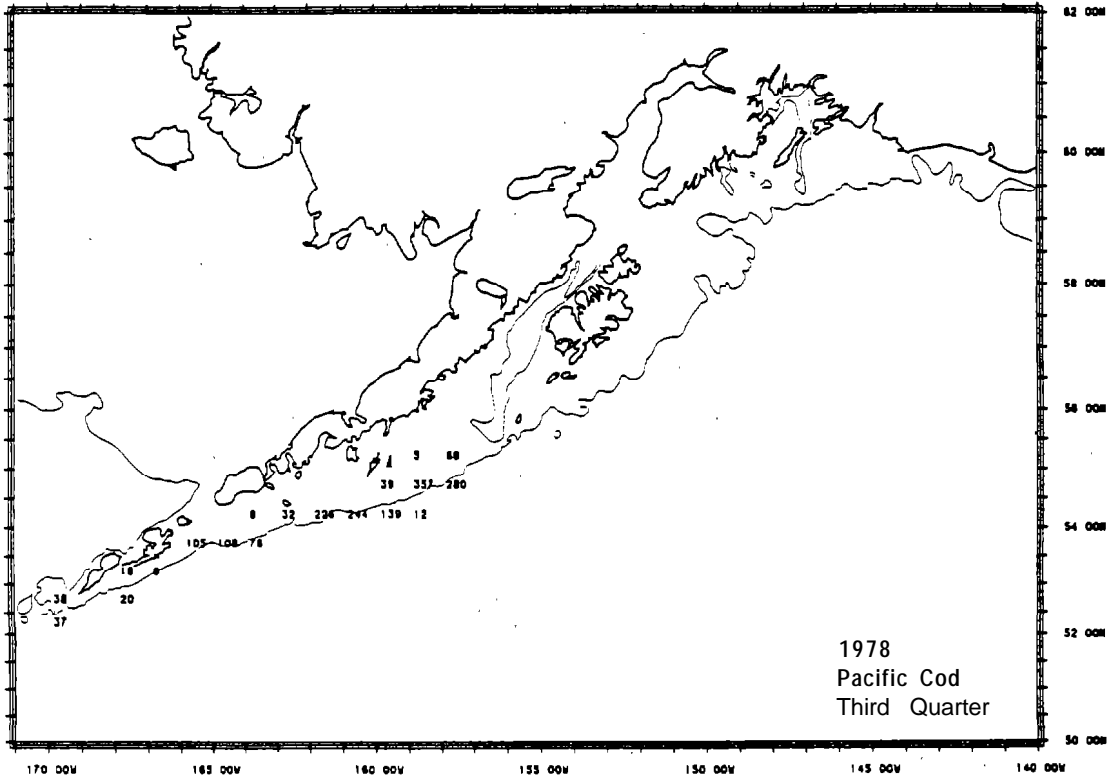


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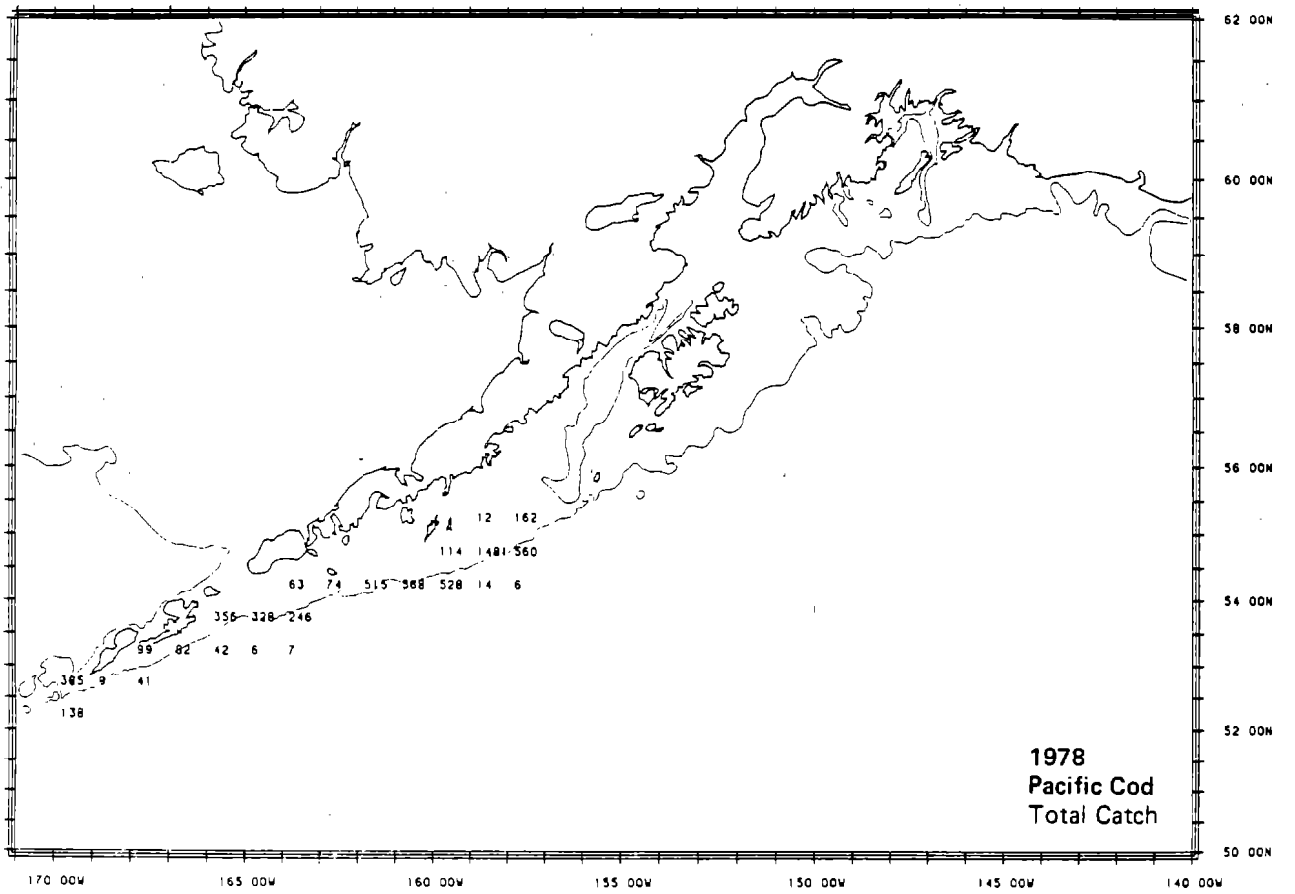


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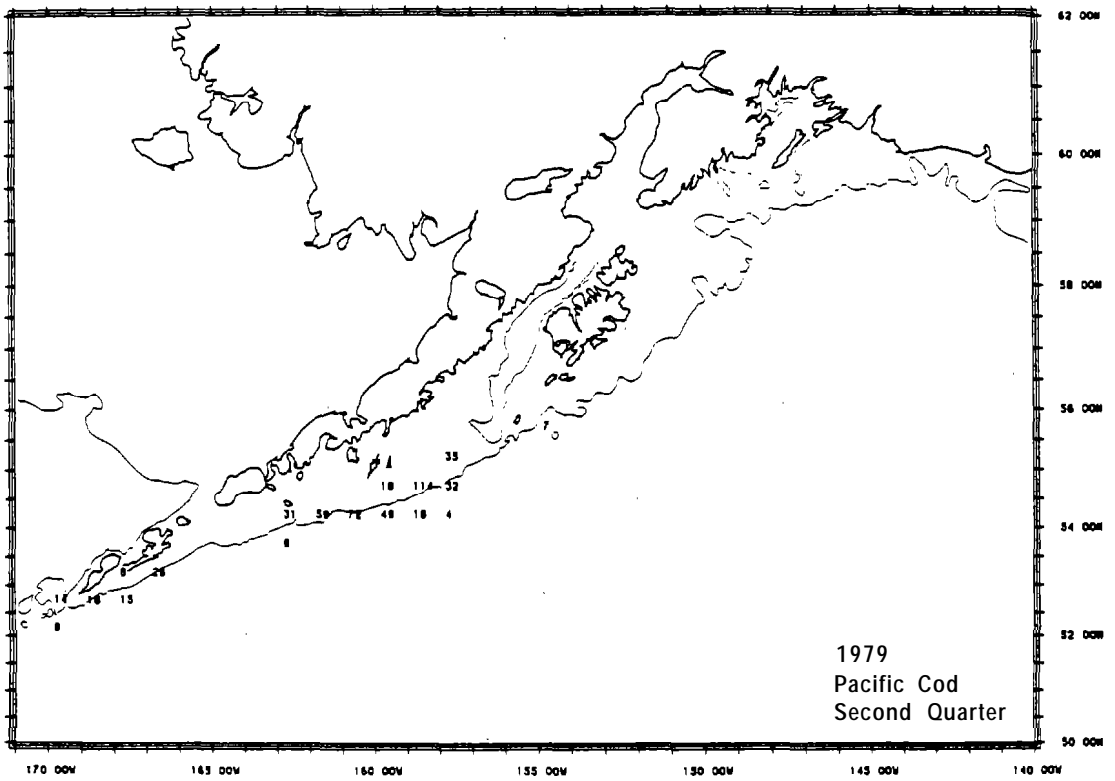
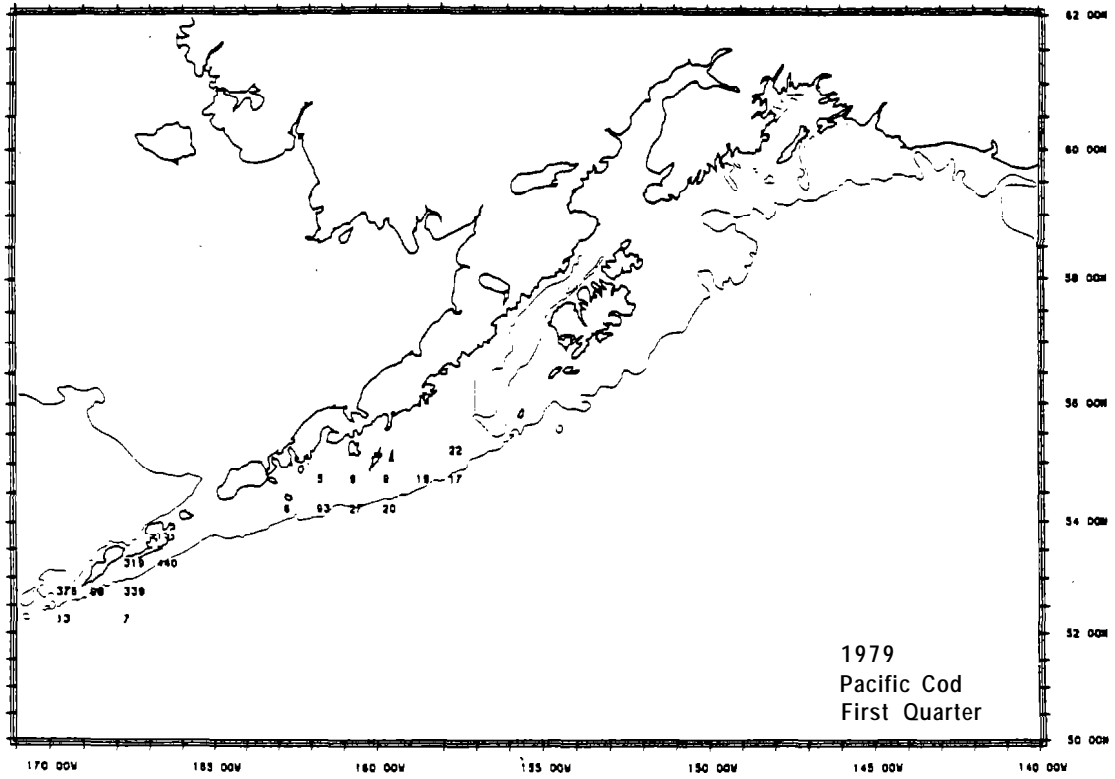


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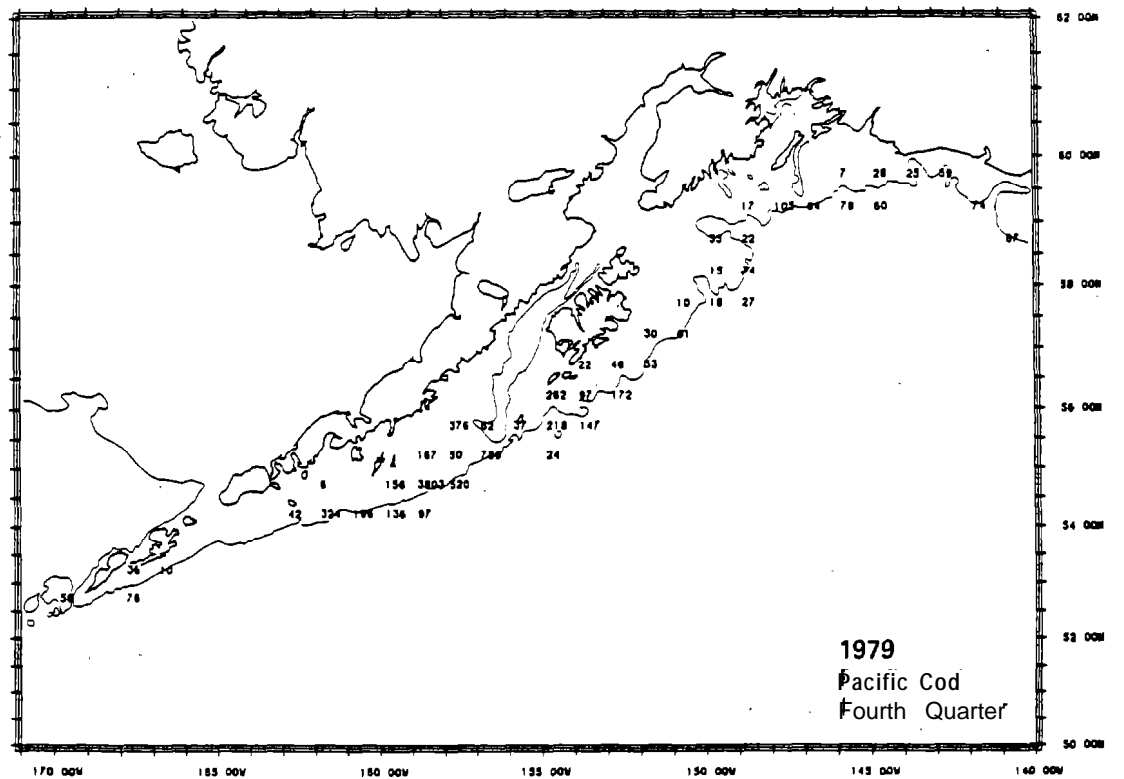
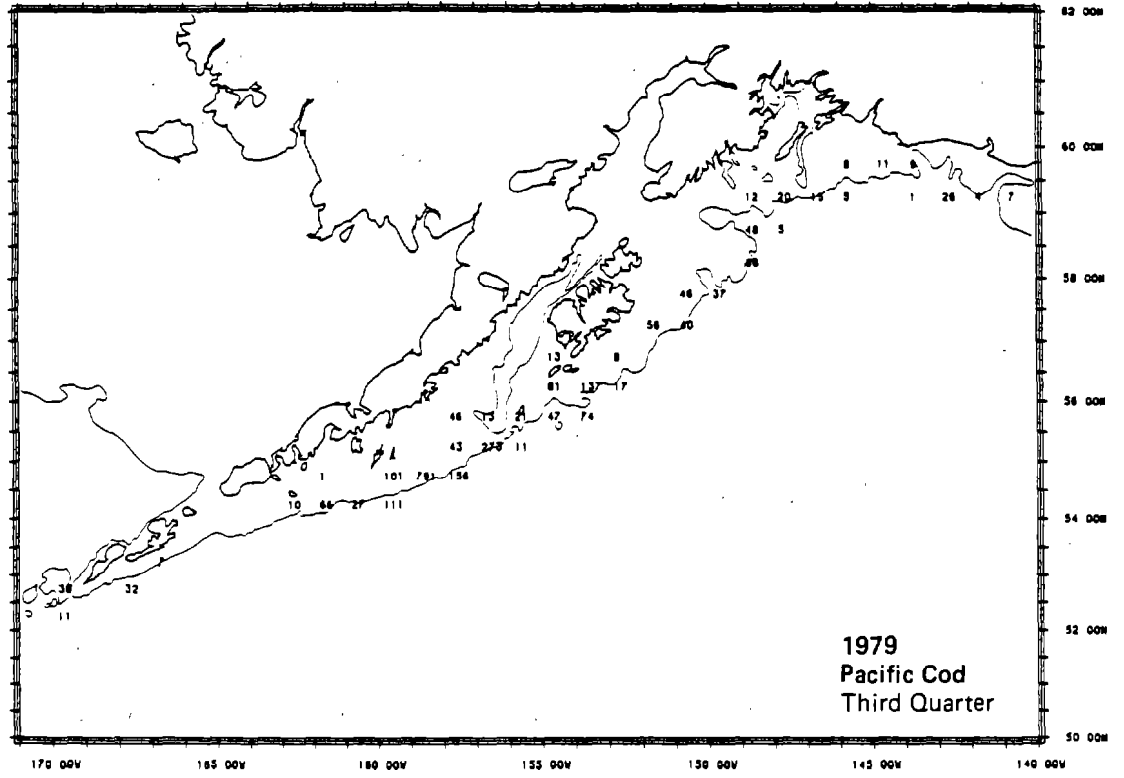


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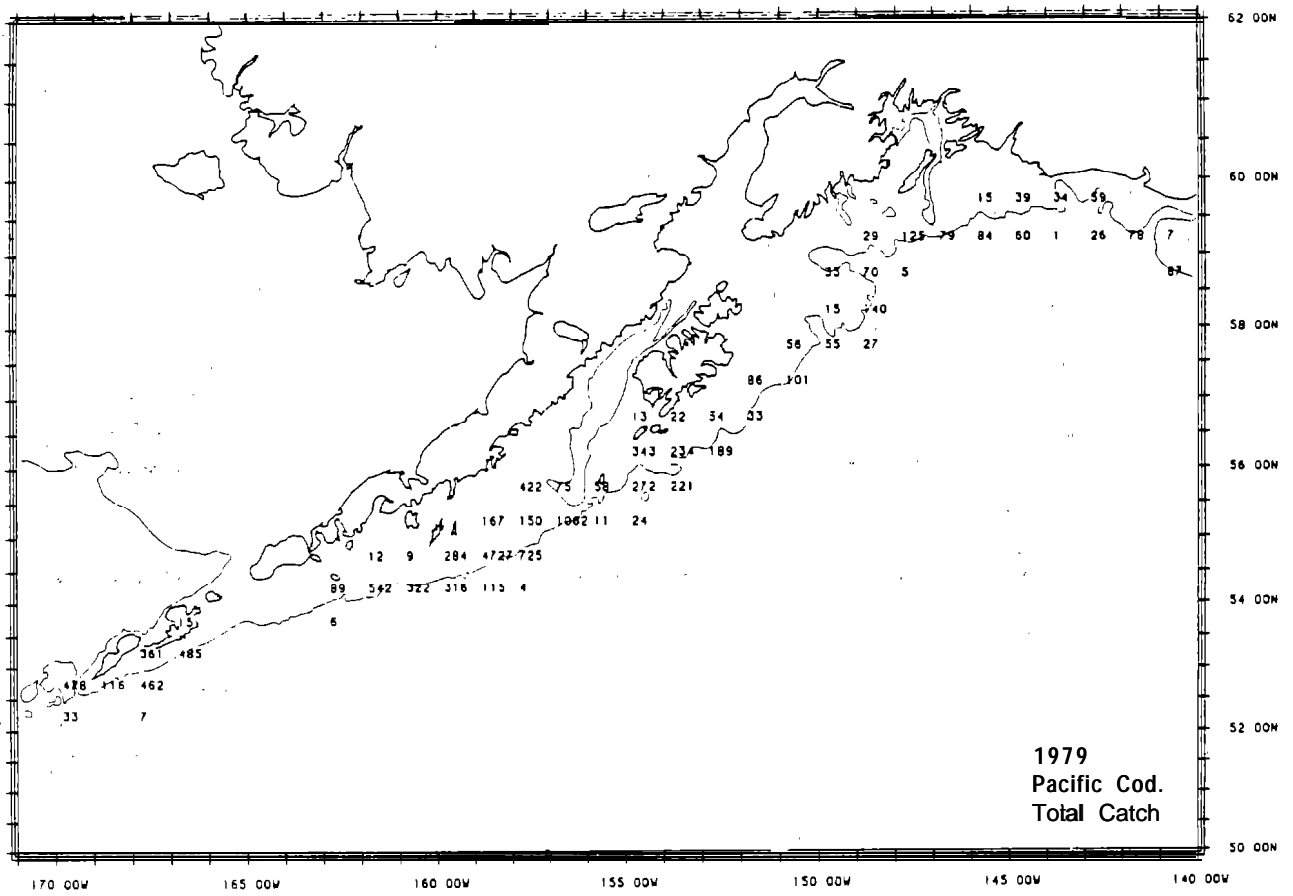


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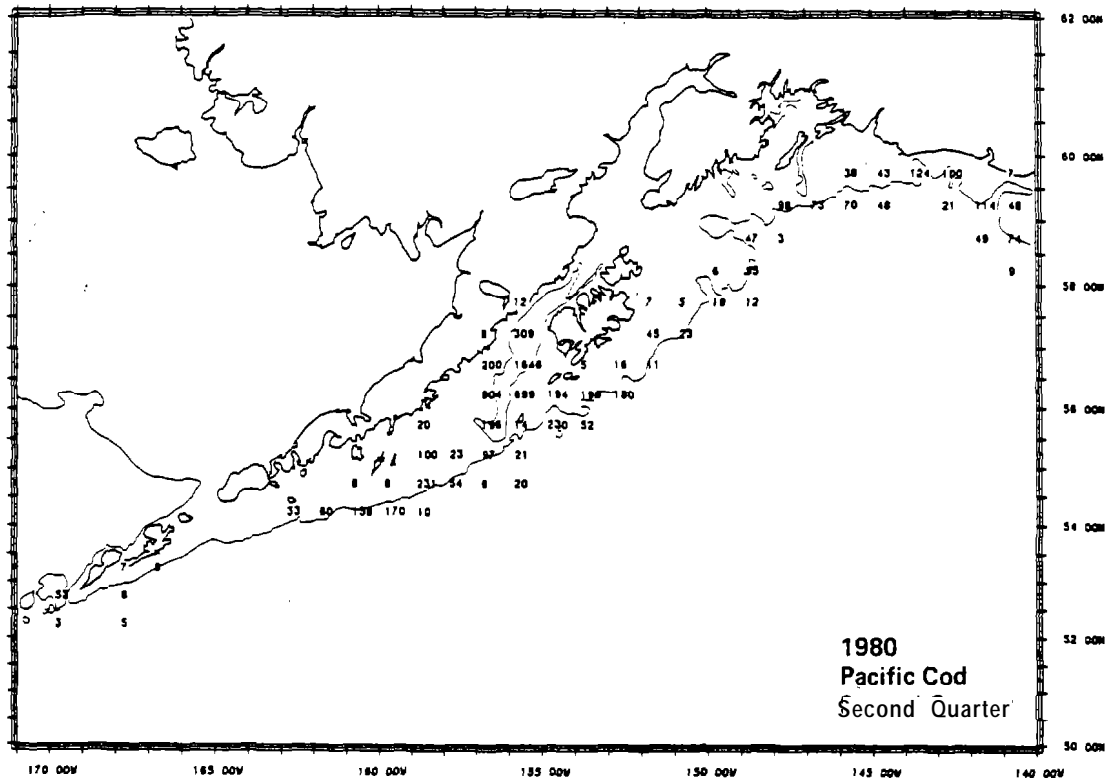
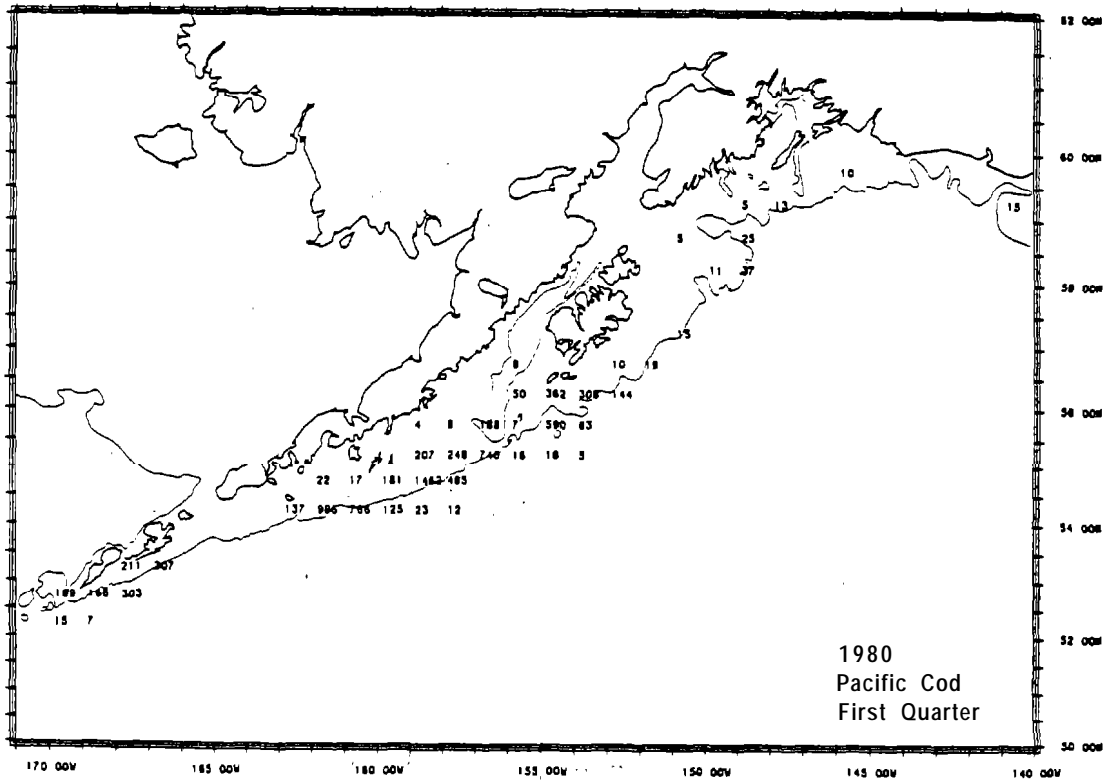


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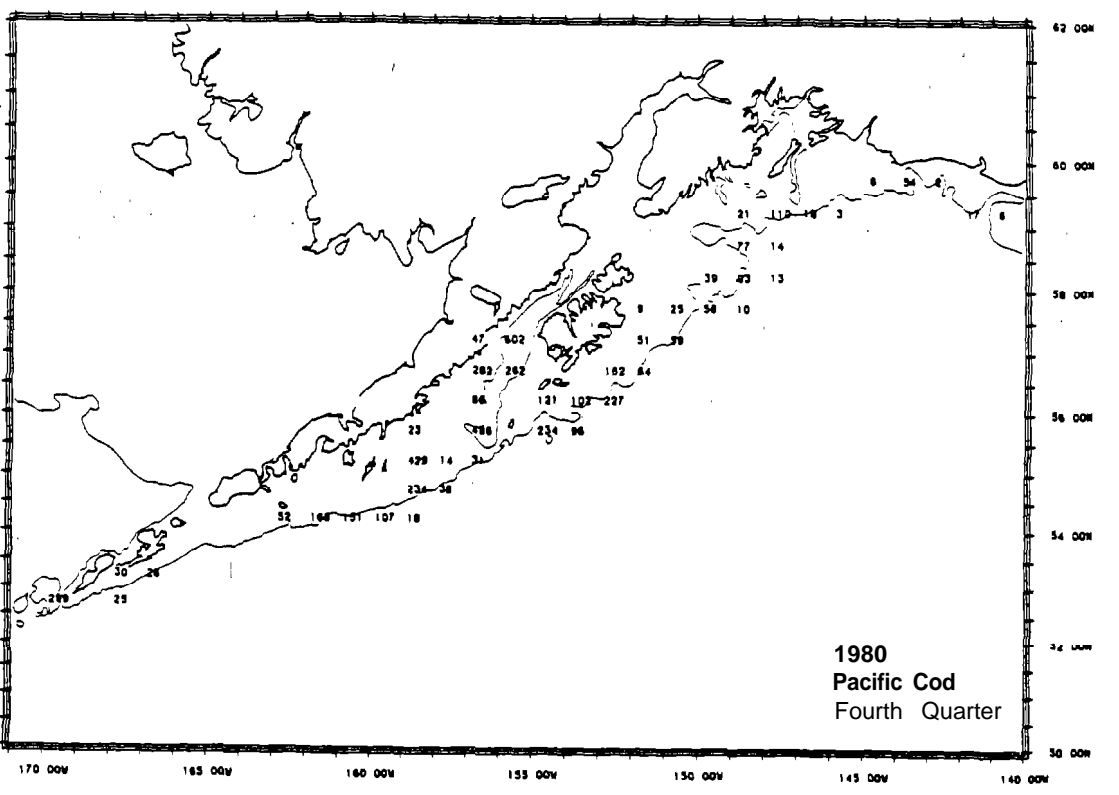
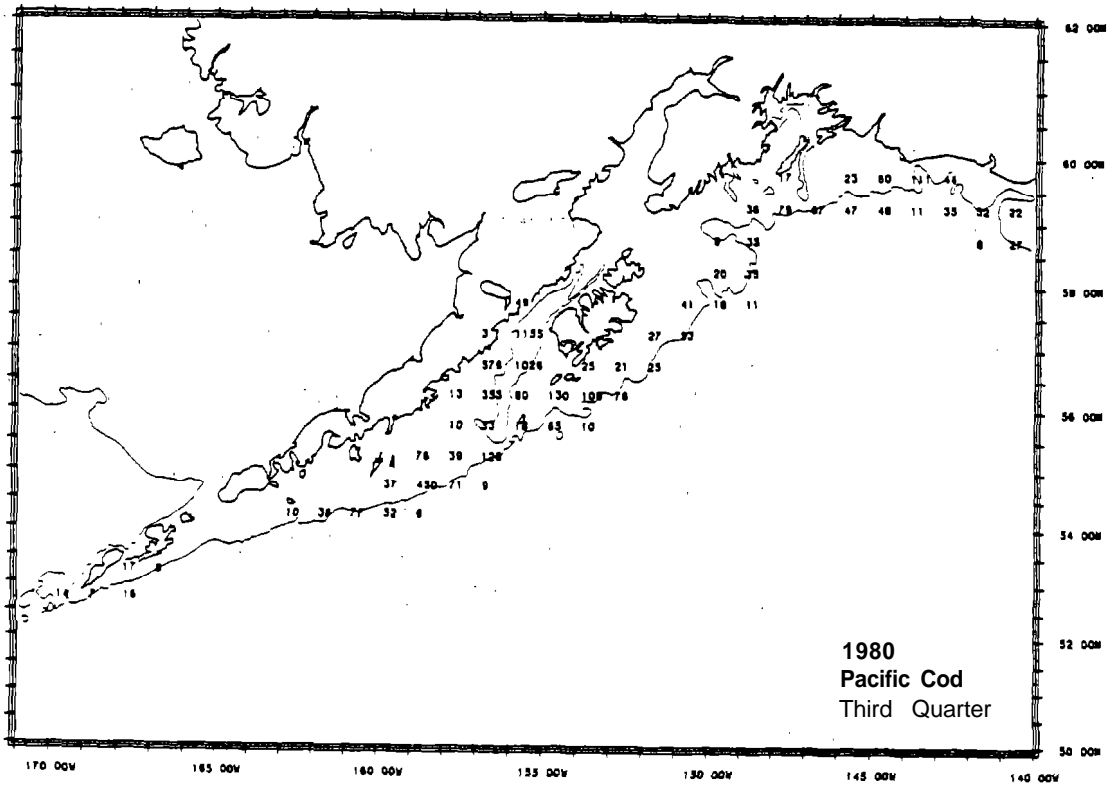


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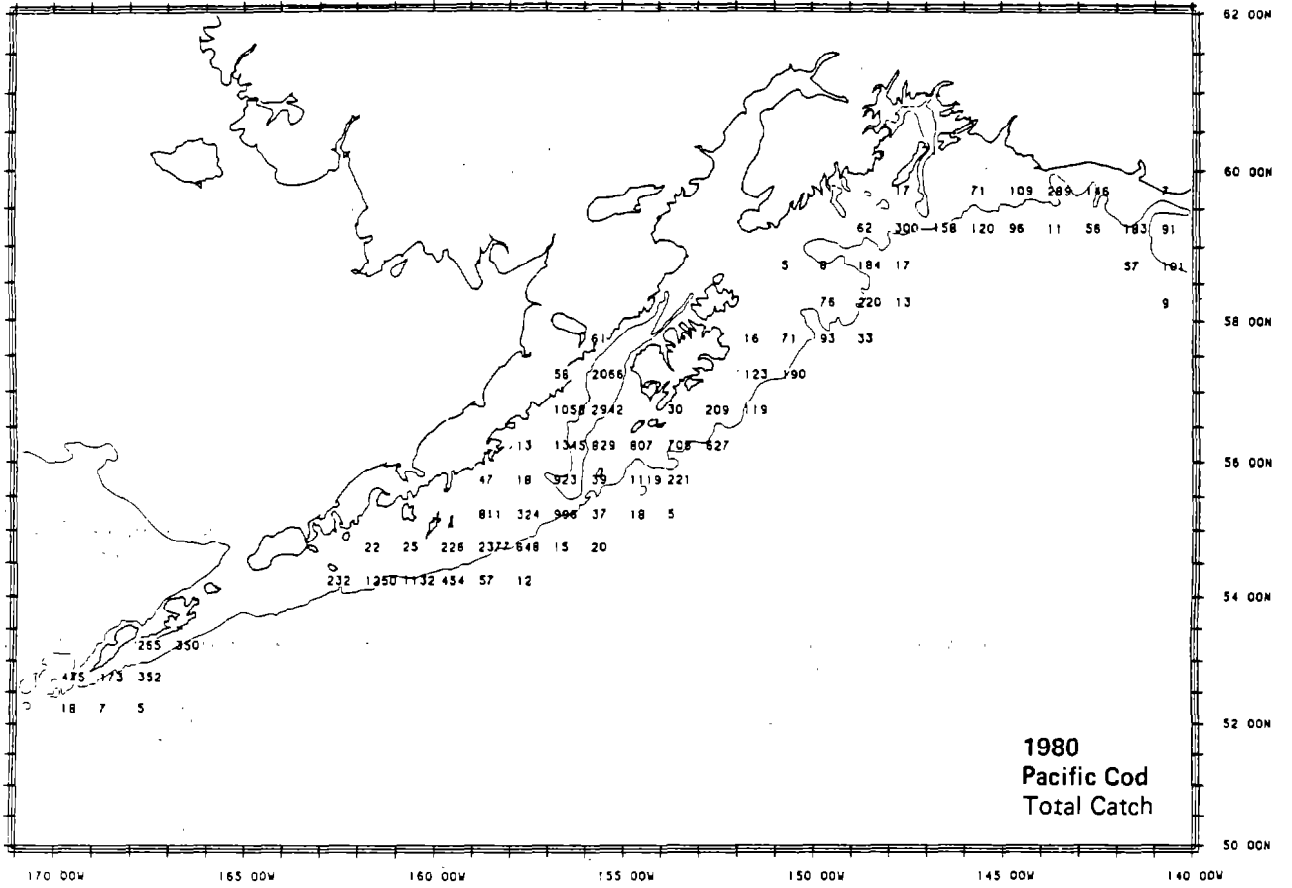


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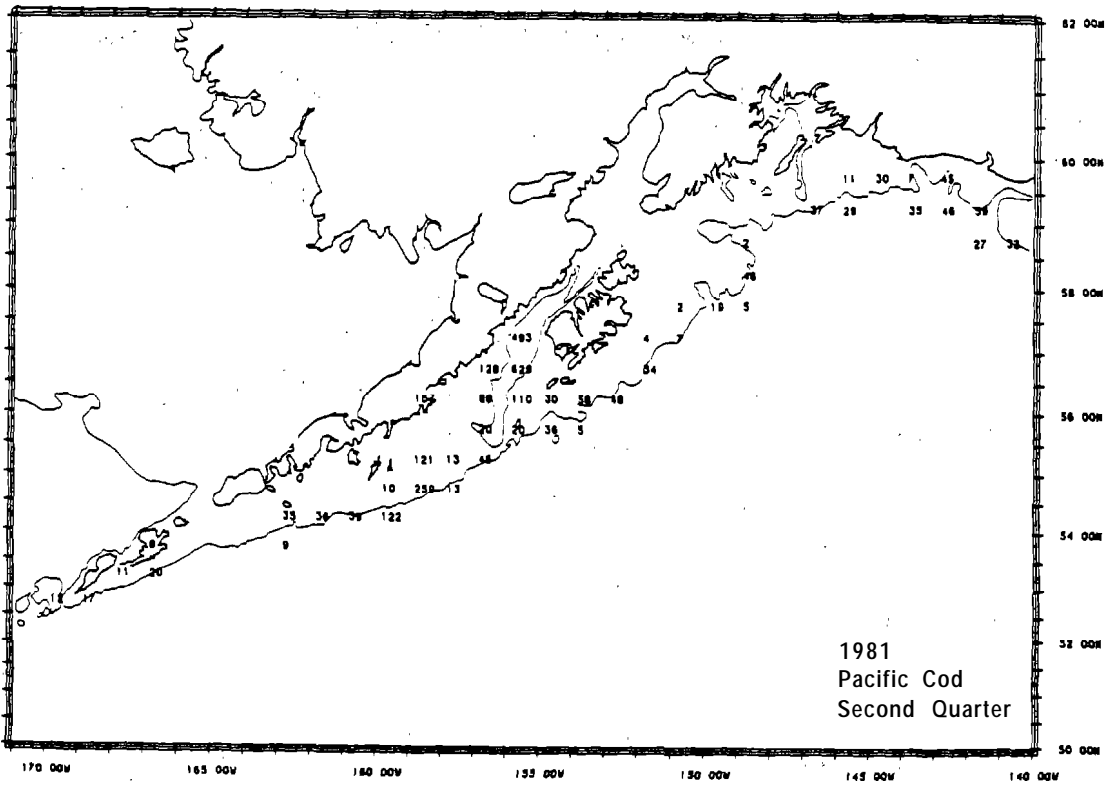
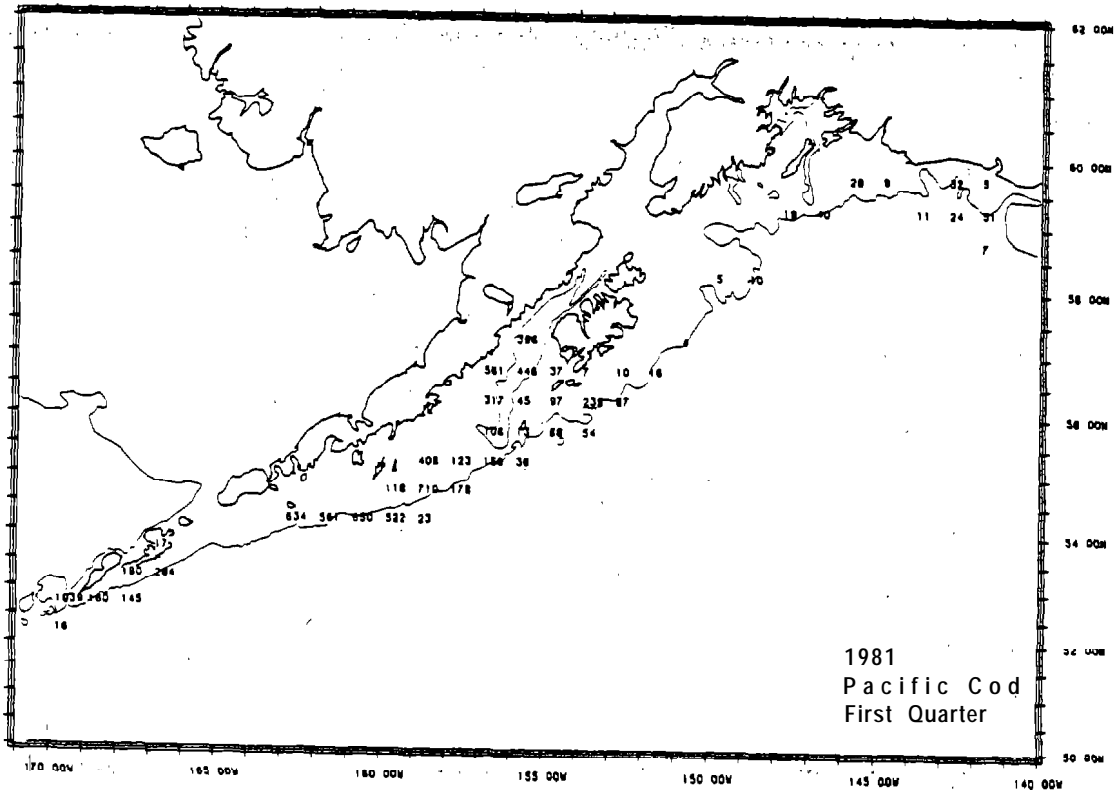


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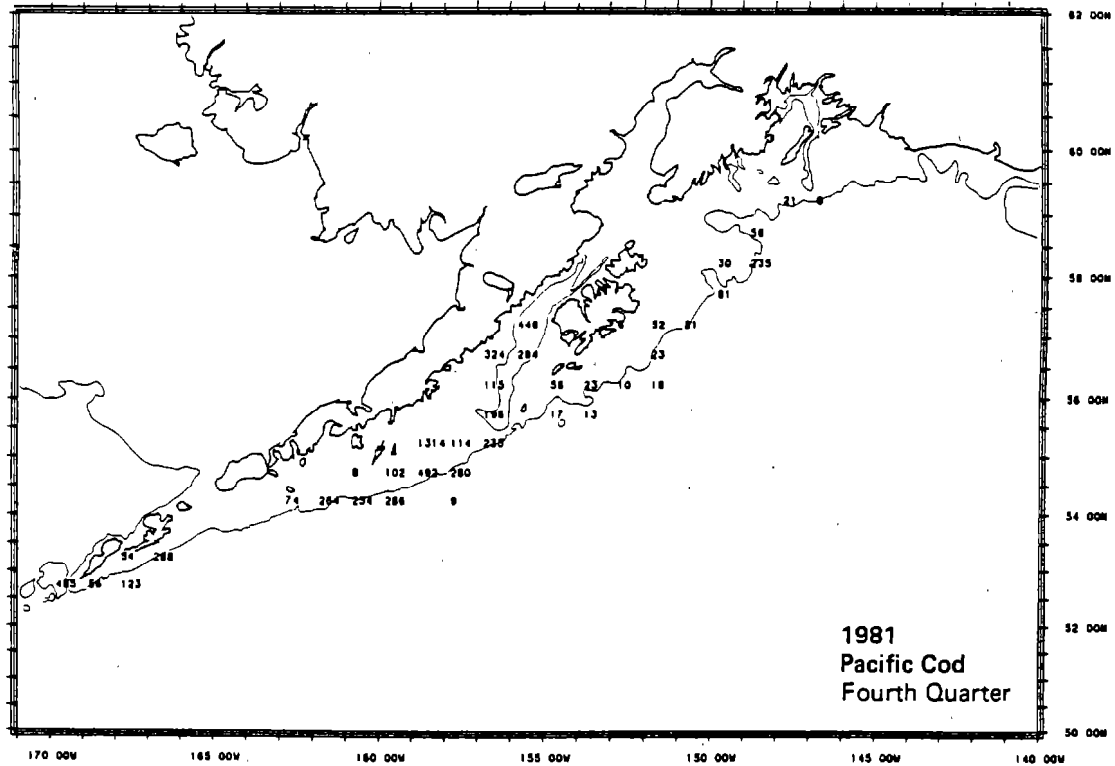
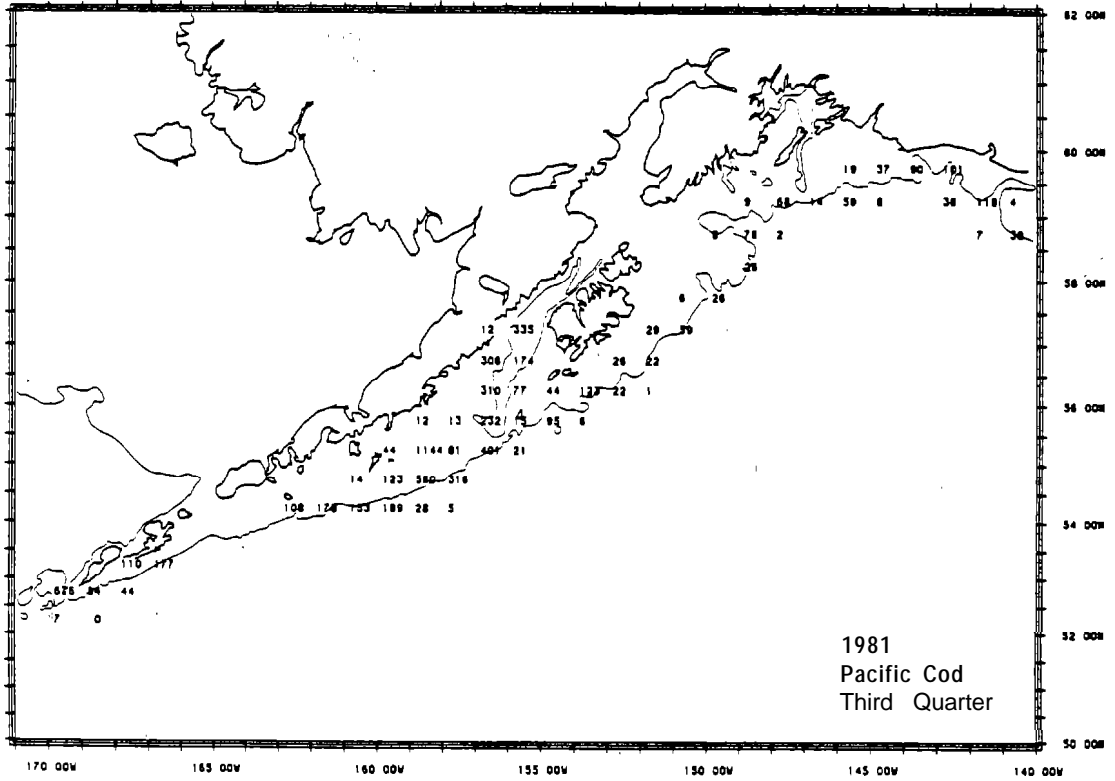


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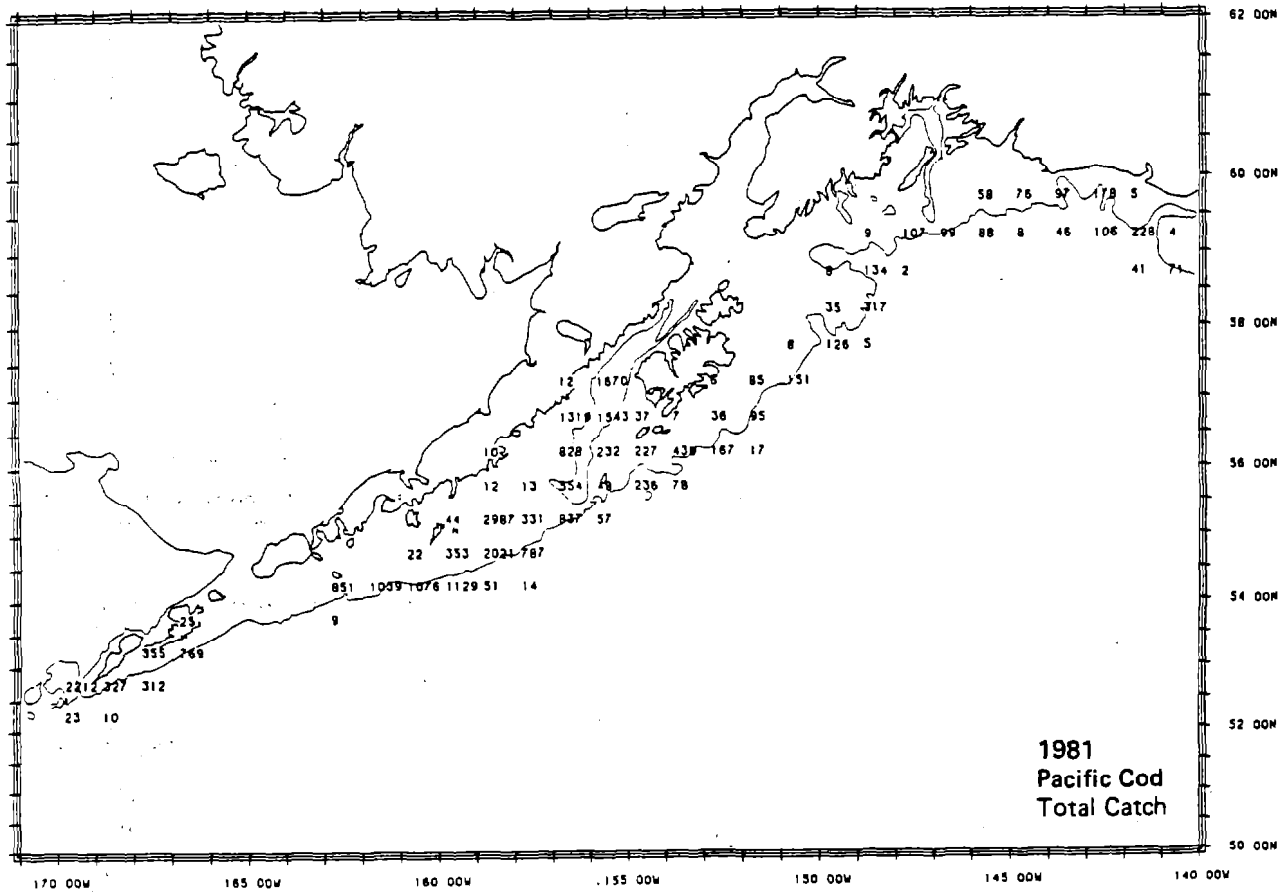


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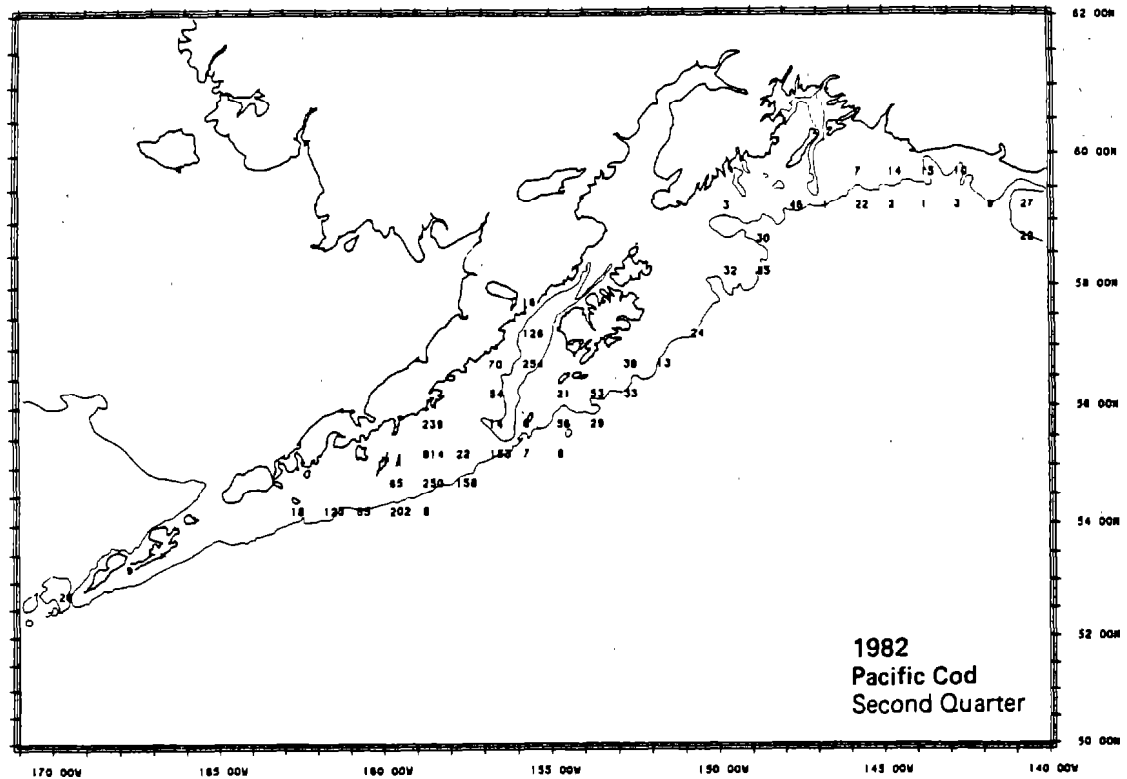
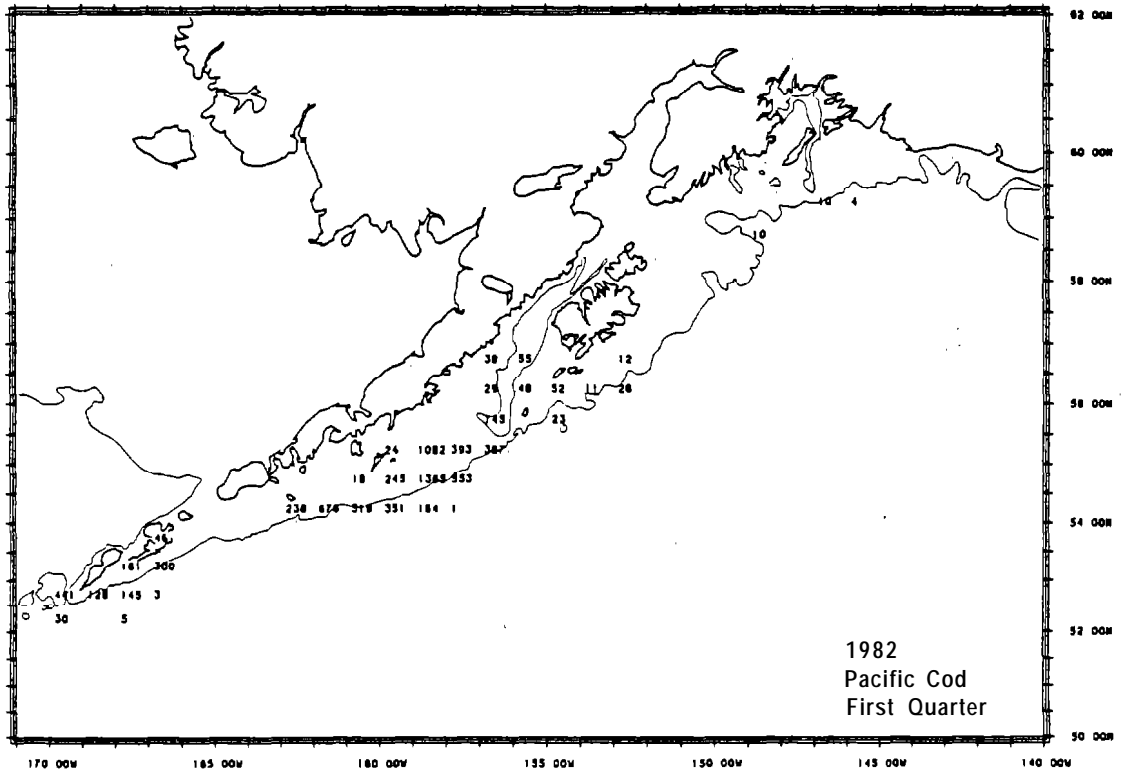


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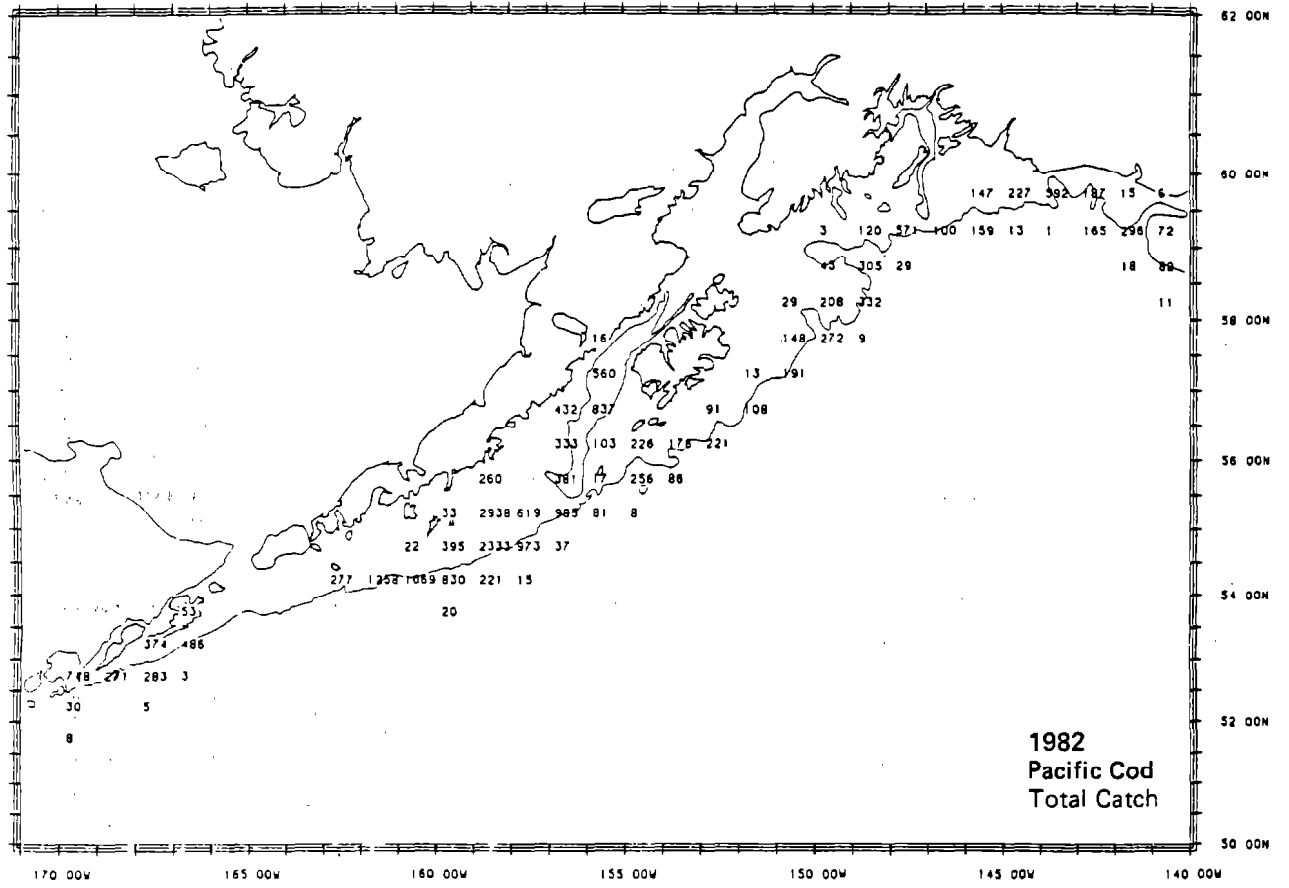
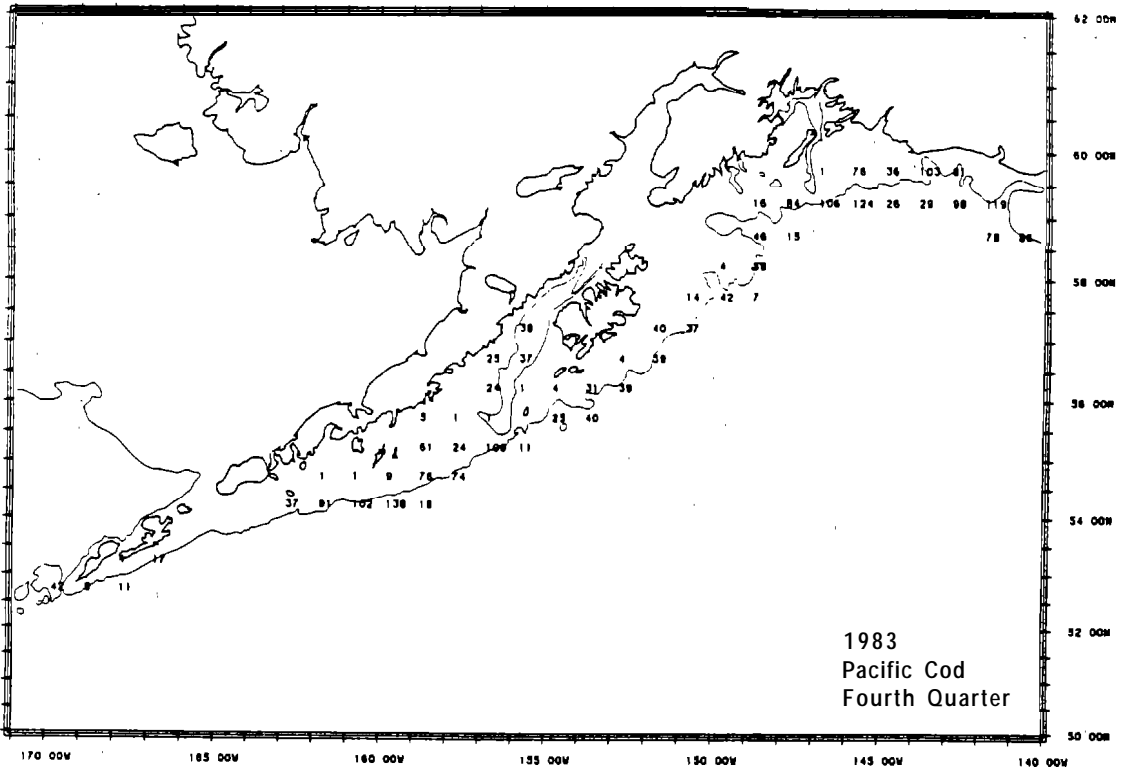
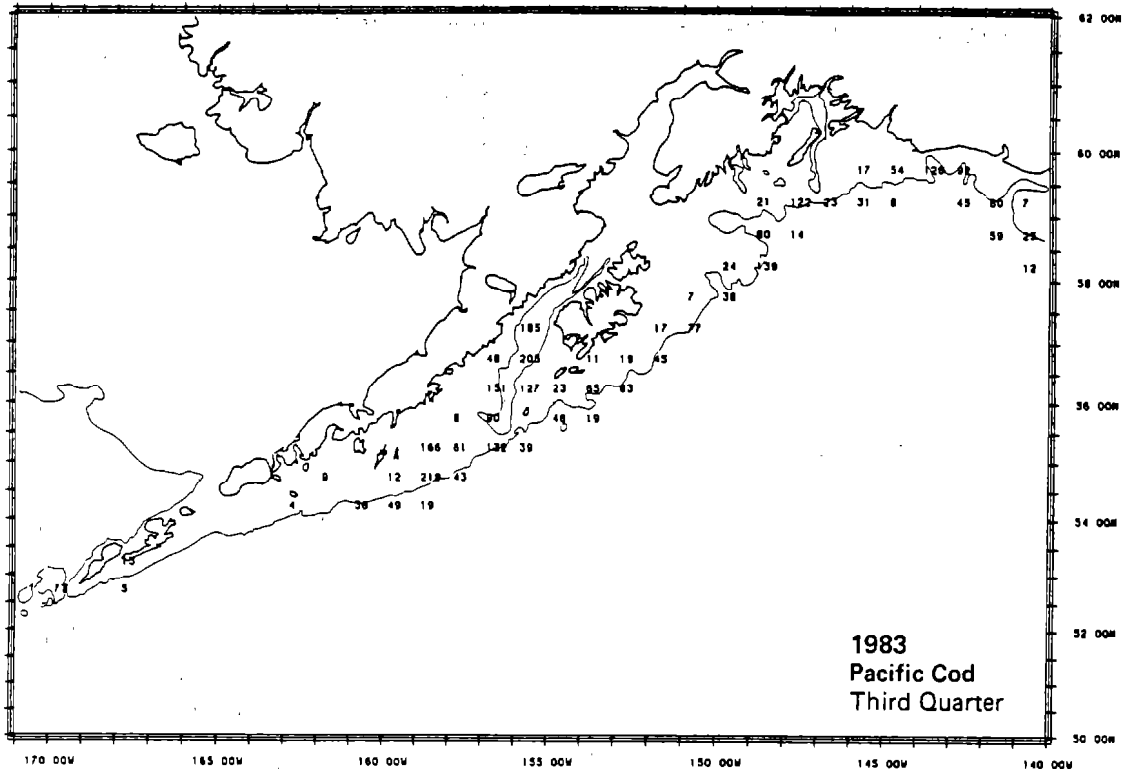


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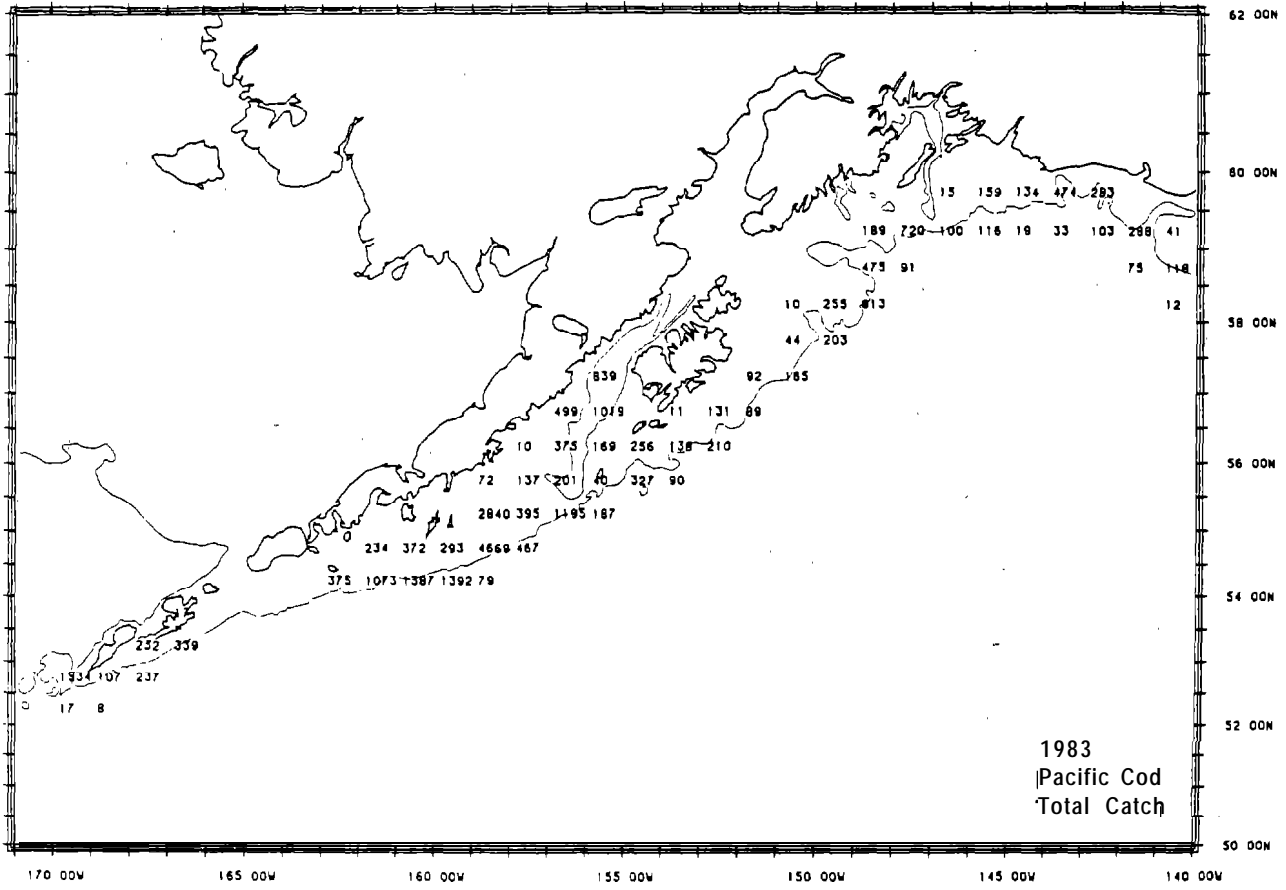


Figure 2. --Continued.

was the statistical block located southeast of the Shumagin Islands where 3,800 t of cod were reported. Cod were harvested in all INPFC areas with the lowest catches being reported from the eastern sections. In the second quarter of **1980**, Shelikof Trough, west of Kodiak Island, produced the largest total catch of cod for the year (1,646 t). Earlier in the year Shumagin Gully was a good producer and relatively high catches came from the Sanak Island area. The following years, **1981** and **1982**, showed similar catch patterns. One **small** but notable area on the south side of the Aleutian Islands between longitude **169°** and 170° west produced high seasonal catches. The highest was 1,039 t reported for the first quarter of **1981**. The area was an erratic producer, which may have been due to the very unfavorable terrain, ocean currents, or seasonal fluctuations in cod abundance.

A fact not readily apparent in these data is that the most productive areas fished by Japanese longliners may not be easily fished by trawls. In some cases, cod concentrate around edges and slopes where rough bottom is common and longlines perform well.

Catch and effort data gathered by the U.S. Foreign Fisheries Observer Program show that Pacific cod were taken infrequently in waters deeper than 300 m. Estimated CPUEs for depths shallower than 300 m and by INPFC area are summarized in Table 2.

Although this report addresses distinct depth intervals in both the tables and text, those depths are originally reported as the average depths of a longline set that **sometimes** extends over a wide range of actual depths. Average depths give only a best estimate of those actually fished.

In the Shumagin INPFC area, the CPUE increased after **1978** and peaked

Table 2.--Annual catch per unit effort (metric tons per 1,000 hooks) of Pacific cod by depth and International North Pacific Fisheries Commission (INPFC) area in the Gulf of Alaska, 1978-83.

Year	Depth (m)	INPFC Area			
		Shumagin	Chirikof	Kodiak	Yakutat
1978	100-199	0.514	0.669	NS ^a	NS
	200-299	0.586 ^b	0.521	NS	NS
	100-299	0.517	0.644	NS	NS
1979	100-199	0.572	0.581	0.833	0.193 ^b
	200-299	0.610	0.737	0.413 ^b	NS
	100-299	0.584	0.631	0.684	0.193
1980	100-199	0.622	0.547	0.404	NS
	200-299	0.671	0.672	0.569	NS
	100-299	0.641	0.627	0.504	NS
1981	100-199	0.688	0.646	0.354	NS
	200-299	0.710	0.554	0.412 ^b	NS
	100-299	0.691	0.629	0.361	NS
1982	100-199	0.823	0.690	0.456	0.030
	200-299	0.688	0.640	NS	NS
	100-299	0.794	0.686	0.456	0.030
1983	0-99	0.846 ^b	NS	NS	NS
	100-199	0.734	0.764	0.444	NS
	200-299	0.445	0.662	0.624	0.328 ^b
	0-299	0.729	0.745	0.598	0.328

^a NS = No sample

^b Relatively small sample

Source : U.S. observer data provided by Jerald Berger, Resource Ecology and Fisheries Management Division, Northwest and Alaska Fisheries Center, 7600 Sand Point Way NE, Bin C15700, Bldg. 4, Seattle, WA 98115.

in **1982**, while in the Chirikof and Kodiak areas it decreased from 1978 to **1981**, then increased in 1982 and **1983**. Lowest catch rates for Pacific cod occurred in the Yakutat INPFC area. Quarterly CPUE indices do not show a clear seasonal trend although U.S. fishermen who harvest cod in the southeast Bering Sea, Aleutian Islands, and western Gulf of Alaska relate that catch rates are usually highest from mid-fall through early spring and decrease after spawning occurs. Relatively high catch rates in **1982** and 1983 during all quarters may have been the result of unusually high cod abundance that masked seasonal trends (Table 3). In the first quarter of **1980**, recruitment of an unusually large year class of cod became apparent in the fishery. This was reflected early in the year by the smaller average fish weights from **100** to **199 m** in the Chirikof INPFC area and during the last two quarters of 1980 in the Shumagin area (Table 3).

Pacific cod length-frequency data collected by observers working aboard Japanese longliners in the Gulf of Alaska were summarized by quarter for the years 1979-83 in a recent publication on status-of-stocks (Zenger 1985). Those data, weighted by metric tons of cod captured by one centimeter length increments, are found in Figure 3. These length frequencies also attest to the entrance of the large **1977 year class** during the first quarter of **1980**. That year class can be followed through time as it grew into the dominant contributor to the Japanese longline catches by the fourth quarter of 1980, and continued to overshadow all others into **1983**. No other year class comparable in abundance to that of **1977** has appeared although Pacific cod continue to be recruited to the fishable stocks as 40-45 cm fish. Cod abundance in the Gulf of Alaska remains relatively high, but how much longer that situation will continue is uncertain. The **1977** year class may have passed its peak biomass and

Table 3.--Quarterly catch per unit effort of Pacific cod (metric tons per 1,000 hooks) and average weight per fish (kilograms) realized by Japanese longliners in three Gulf of Alaska International North Pacific Fisheries Commission (INPFC) areas and 100 meter depth intervals for the years 1978-83.

Year and quarter	Depth (m)	INPFC Area						
		Shumagin		Chirikof		Kodiak		
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	
1978	Q2	100-199	1.002 ^a	2.3	0.902 ^a	3.4	NS ^b	
		200-299	NS		NS		NS	
		100-299	1.002 ^a	2.3	0.902 ^a	3.4	NS	
	Q3	100-199	0.400	2.8	0.431	2.8	NS	
		200-299	NS		0.370	3.5	NS	
		100-299	0.400	2.8	0.418	2.9	NS	
	Q4	100-199	0.559	2.9	0.805	2.9	NS	
		200-299	0.586 ^a	3.5	0.696	3.2	NS	
		100-299	0.562	3.0	0.790	2.9	NS	
1979	Q1	100-199	0.632	3.6	NS		NS	
		200-299	0.600	3.5	NS		NS	
		100-299	0.620	3.6	NS		NS	
	Q2	100-199	0.394 ^a	2.6	0.425 ^a	2.6	NS	
		200-299	0.580 ^a	3.3	NS		NS	
		100-299	0.437 ^a	2.8	0.425 ^a	2.6	NS	
	Q3	100-199	0.309 ^a	3.0	0.562	3.6	0.858 ^a	4.0
		200-299	NS		0.478	3.4	NS	
		100-299	0.309 ^a	3.0	0.534	3.5	0.858 ^a	4.0
	Q4	100-199	0.268 ^a	2.3	0.604	3.1	0.809 ^a	4.0
		200-299	0.710 ^a	3.5	0.849	3.2	0.413 ^a	2.9
		100-299	0.435 ^a	3.0	0.685	3.1	0.602 ^a	3.5

Table 3.--Continued.

1980	Q1	100-199	0.766	3.8	0.719	2.2	NS	
		200-299	0.719	2.9	0.741	2.6	0.585 ^a	2.8
		100-299	0.748	3.3	0.737	2.5	0.585 ^a	2.8
	Q2	100-199	0.196 ^a	3.6	0.475	2.2	0.516 ^a	2.9
		200-299	NS		0.574	2.9	0.538 ^a	3.0
		100-299	0.196 ^a	3.6	0.538	2.7	0.528 ^a	3.0
	Q3	100-199	0.374 ^a	2.0	0.510	2.8	0.344 ^a	2.9
		200-299	0.137 ^a	1.6	0.619	2.6	0.677 ^a	2.9
		100-299	0.343 ^a	1.9	0.561	2.7	0.454 ^a	2.9
	Q4	100-199	0.271 ^a	2.1	NS		0.283 ^a	2.0
		200-299	0.367 ^a	1.6	NS		0.511 ^a	2.7
		100-299	0.306 ^a	1.4	NS		0.397 ^a	2.4
1981	Q1	100-199	0.732	2.7	0.608	2.1	NS	
		200-299	0.549 ^a	3.0	0.627	2.5	NS	
		100-299	0.705	2.8	0.614	2.2	NS	
	Q2	100-199	0.566	2.4	0.794 ^a	2.0	0.509 ^a	3.1
		200-299	NS		NS		NS	
		100-299	0.566	2.4	0.794 ^a	2.0	0.509	3.1
	Q3	100-199	0.576	2.6	0.660	2.2	0.298 ^a	2.2
		200-299	NS		0.254 ^a	2.0	NS	
		100-299	0.576	2.6	0.625	2.2	0.298 ^a	2.2
	Q4	100-199	0.755	2.7	0.616	2.1	NS	
		200-299	0.949 ^a	3.5	0.694 ^a	2.2	0.412 ^a	1.7
		100-299	0.778	2.8	0.626	2.1	0.412 ^a	1.7
1982	Q1	100-199	0.712	3.8	0.873	2.4	0.162 ^a	3.0
		200-299	0.854	3.7	0.789	2.2	NS	
		100-299	0.783	3.8	0.871	2.4	0.162	3.0

Table 3.--Continued.

	Q2	100-199	0.605 ^a	2.2	0.517	2.4	0.419	1.8
		200-299	NS		NS		NS	
		100-299	0.605 ^a	2.2	0.517	2.4	0.419	1.8
	Q3	100-199	1.091 ^a	3.4	0.594	2.2	0.404 ^a	2.3
		200-299	0.582 ^a	2.9	0.605 ^a	2.2	NS	
		100-299	0.964 ^a	3.3	0.597	2.2	0.404 ^a	2.3
	Q4	100-199	0.834	2.9	0.670	2.4	0.580	2.4
		200-299	0.525 ^a	3.2	0.666 ^a	3.2	NS	
		100-299	0.791	2.9	0.670	2.5	0.580	2.4
1983	Q1	100-199	1.252	3.5	1.099	3.4	0.482 ^a	2.5
		200-299	NS		0.471 ^a	2.8	NS	
		100-299	1.252	3.5	1.085	3.4	0.482 ^a	2.5
	Q2	100-199	0.673	2.9	0.578	2.7	NS	
		200-299	NS		0.867	2.4	0.724 ^a	2.8
		100-299	0.673	2.9	0.682	2.5	0.724 ^a	2.8
	Q3	100-199	0.673	2.7	0.544	2.4	NS	
		200-299	NS		0.583	2.4	NS	
		100-299	0.673	2.7	0.553	2.4	NS	
	Q4	0-99	0.846 ^a	3.0	NS		NS	
		100-199	0.666	2.9	0.593	2.5	0.410 ^a	2.2
		200-299	0.445	2.8	0.622	2.7	0.620	2.3
		0-299	0.661	2.9	0.601	2.5	0.602	2.3

^a Relatively small sample

^b NS = No sample

Source: U.S.. observer-data provided by Jerald Berger, Resource Ecology and Fisheries Management Division, Northwest and Alaska Fisheries Center, 7600 Sand Point Way NE, Bin **C15700**, Bldg. 4, Seattle, WA **98115**.

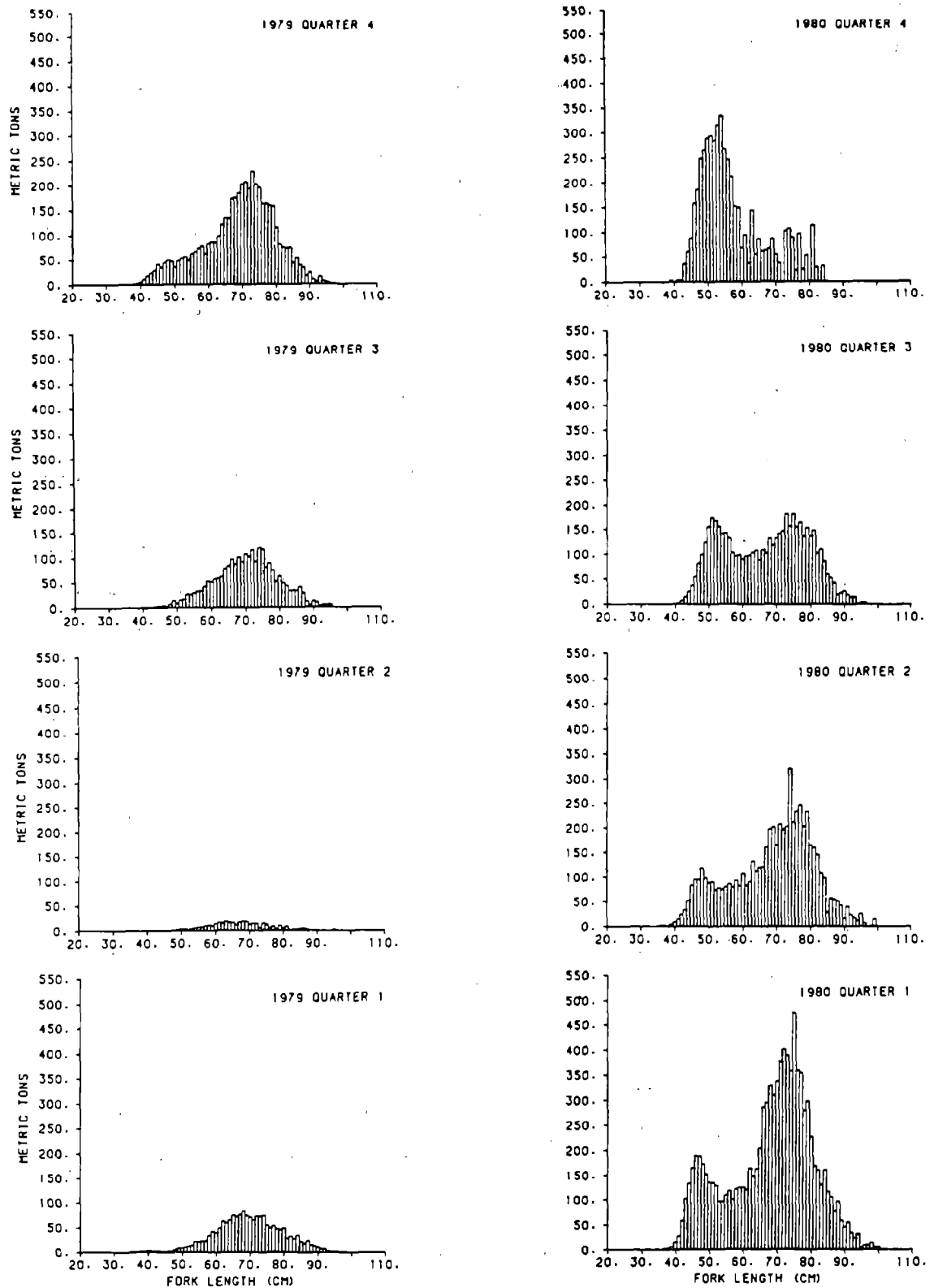


Figure 3. --Length frequencies expressed as metric tons of Japanese longline catches of Pacific cod per centimeter of fork length, by quarter, **1979-83**. (Catch estimates and length frequencies furnished by the U.S. Foreign Fisheries Observer Program, Seattle, Washington).

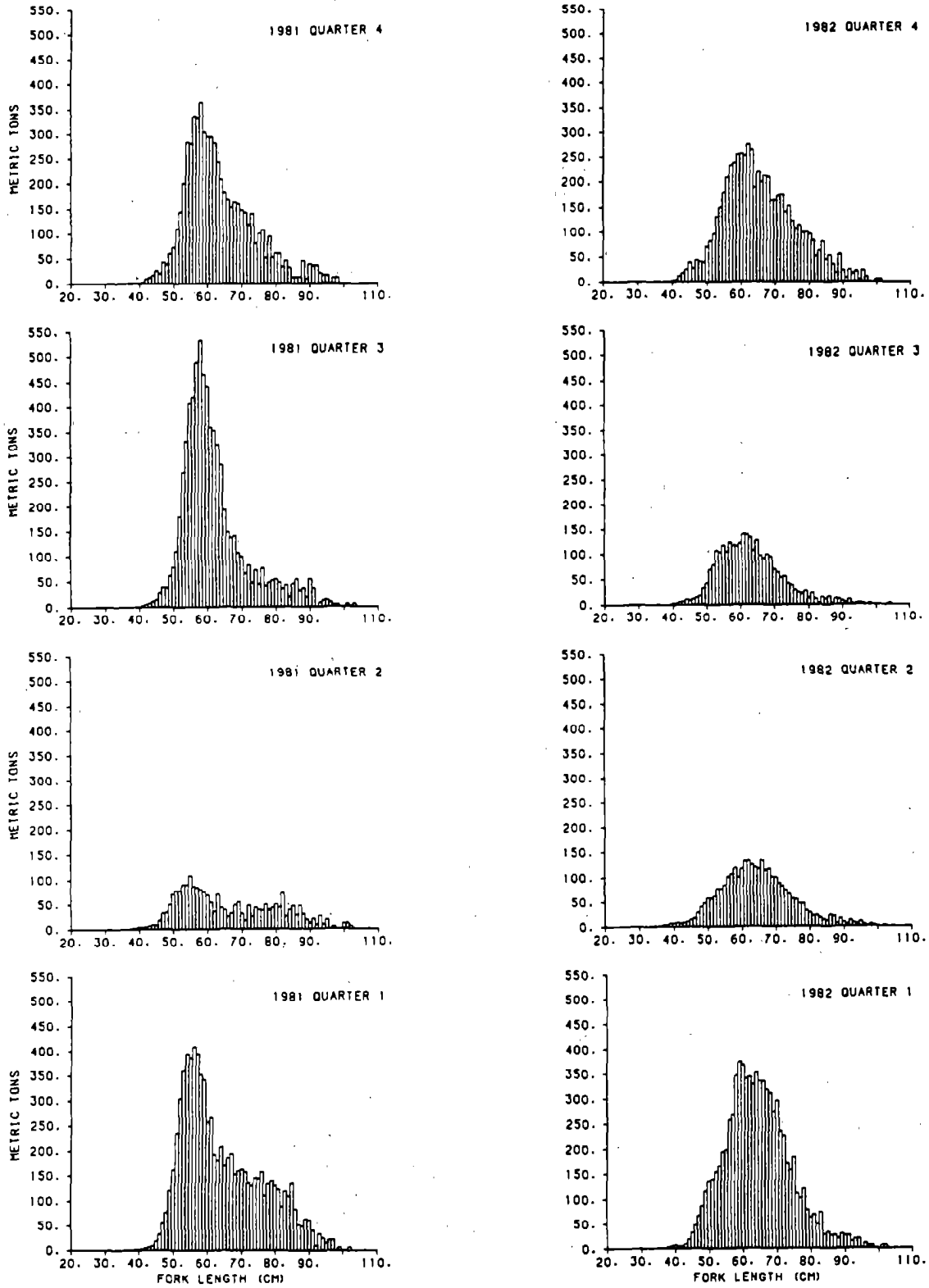


Figure 3.--Continued.

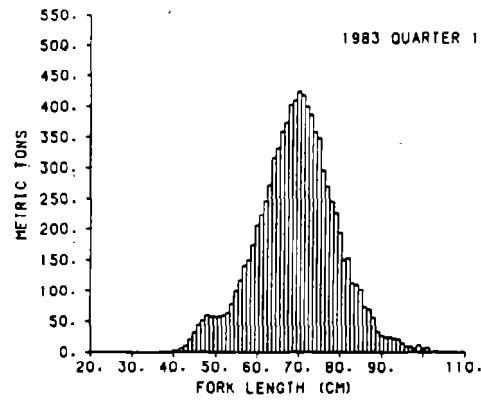
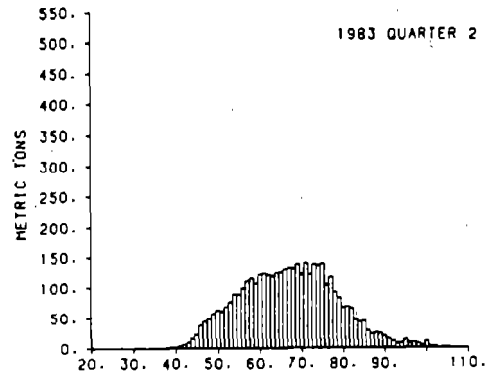
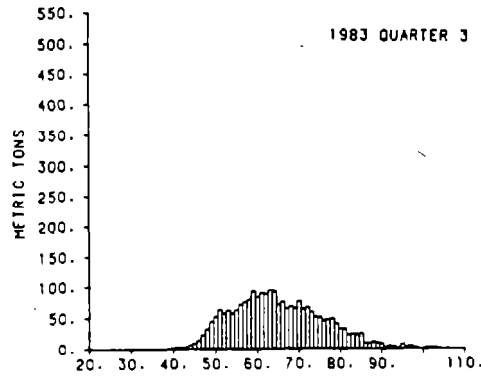
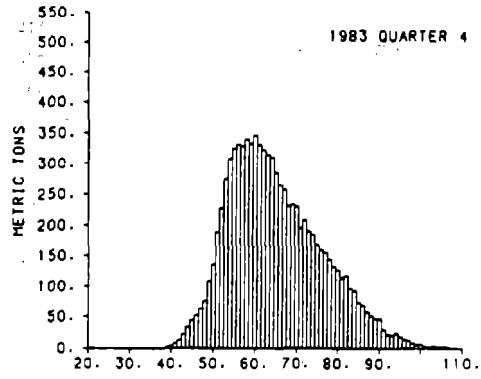


Figure 3. --Continued.

recruitment since 1980 appears to have been relatively weak. Current harvest levels have been well below the optimum yield of 60,000 t established for the Gulf of Alaska (Zenger 1985).

SABLEFISH

Annual sablefish catches in the Gulf have varied widely in recent years. From a low catch of 731 t in 1962 to a high of 37,502 t in 1972, sablefish went through a period of increasing exploitation dominated by Japanese longliners during which severe reductions in stock size occurred. Since 1978, lowered quotas and other restrictions on foreign and domestic longliners fishing sablefish have lowered the total annual catches to approximately 8,500-10,000 t (Table 4).

Mean size of sablefish decreased, in the Gulf of Alaska west of longitude 140° west after 1978. The 1977 year class was particularly large and its effect on the fishery was marked by increasing catches of small fish after 1979. Average sizes of sablefish were smaller between 1980 and 1983 than in 1978-79 (Table 5). Since then other more moderate year classes have contributed to the population (Stauffer 1985).

The sablefish catch data presented in Figure 4 are similar in format to those for Pacific cod.

Adult sablefish are typically found in relatively deep water in the Gulf of Alaska although the depth range of young sablefish may overlap extensively with that of Pacific cod. Until 1979 Japanese longliners reported sablefish catches from the outside edge of the continental shelf, but when effort was directed at Pacific cod in shallower waters, reports of sablefish catches from lower Shelikof Strait west of Kodiak Island and the gully east of the Shumagin Islands (Fig. 1) became common.

Table 4.--Reported total catch and Japanese longline catch of sablefish in the' Gulf of Alaska, 1978-83.

Year	Total all-nation catch (t)	Japanese longline catch (t)	Percent of sablefish catch
1978	8, 866	6, 101	69
1979	10, 349	5, 447	53
1980	8, 542	4, 095	48
1981	9, 917	6, 244	63
1982	8, 557	4, 505	53
1983	9, 049	3, 997	44

Sources : Data for all-nation catch, personal communication from Sandra McDevitt, Resource Ecology and Fisheries Management Division, Northwest and Alaska Fisheries Center, 7600 Sand Point Way NE, BIN C15700, Bldg. 4, Seattle, WA, 98115.

Data for Japanese longline catch condensed from Stauffer (1985).

Table 5.--Average size (cm) of sablefish caught by Japanese
'lorigliners in the' Gulf of Alaska, 1978-1983.

Year	Shumagin	Chirikof	Kodiak	Yakutat
1978	65.8	67.0	67.0	69.9
1979	66.3	64.7	63.5	63.5
1980	60.4	60.9	61.8	59.1
1981	58.9	56.1	59.7	55.8
1982	58.9	58.4	60.3'	59.3
1983	60.8	58.9	60.4	59.2

Source: 'Data condensed from Stauffer (1985).

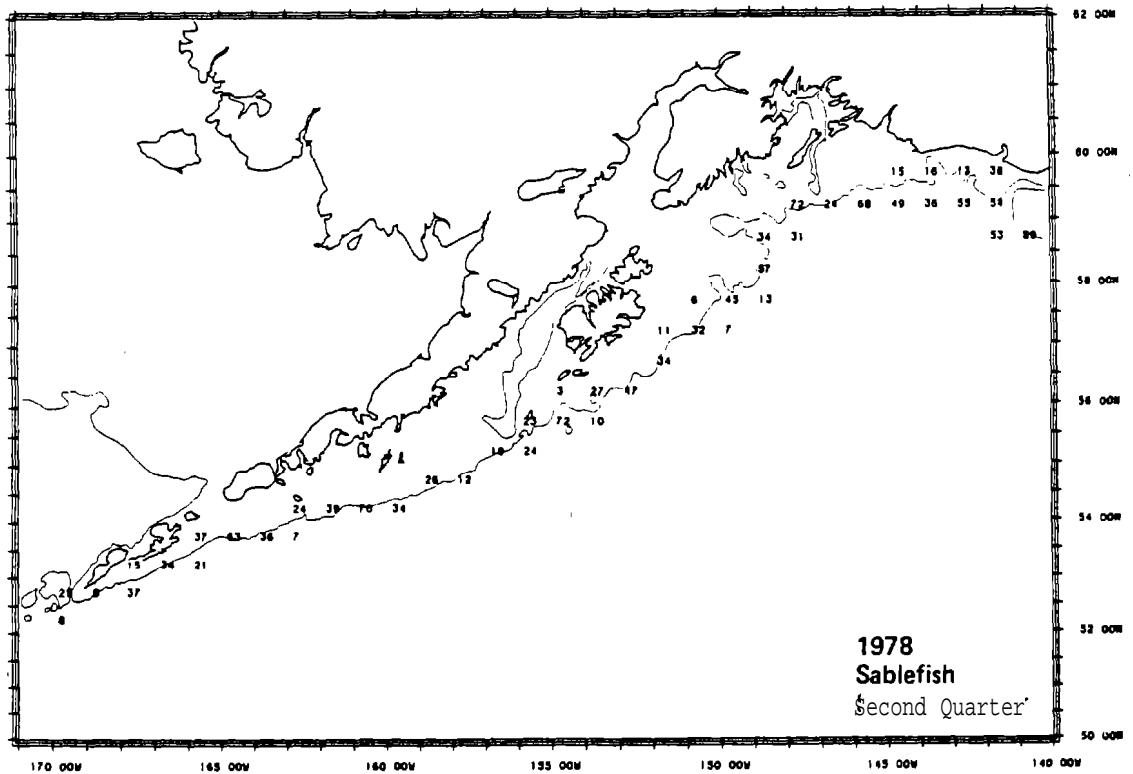
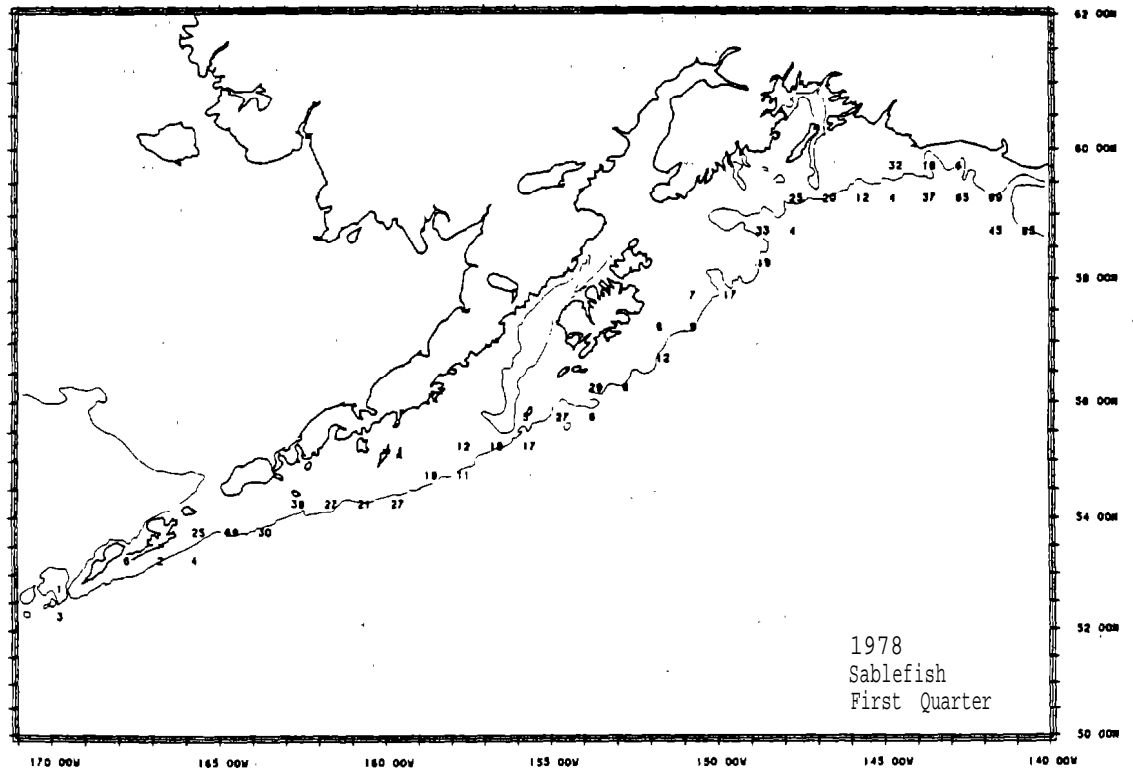


Figure 4. --Quarterly and annual Japanese longline catches (metric tons) of sablefish distributed in statistical blocks, $1/2^\circ$ of latitude by 1° of longitude, 1978-83.

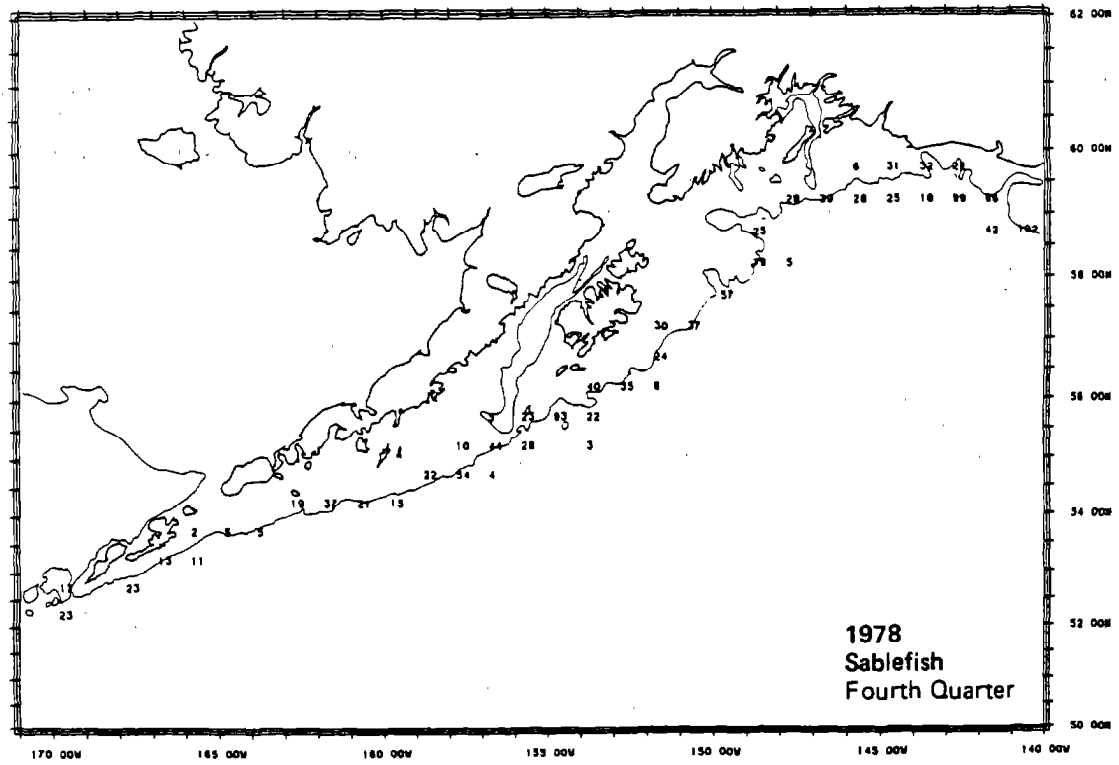
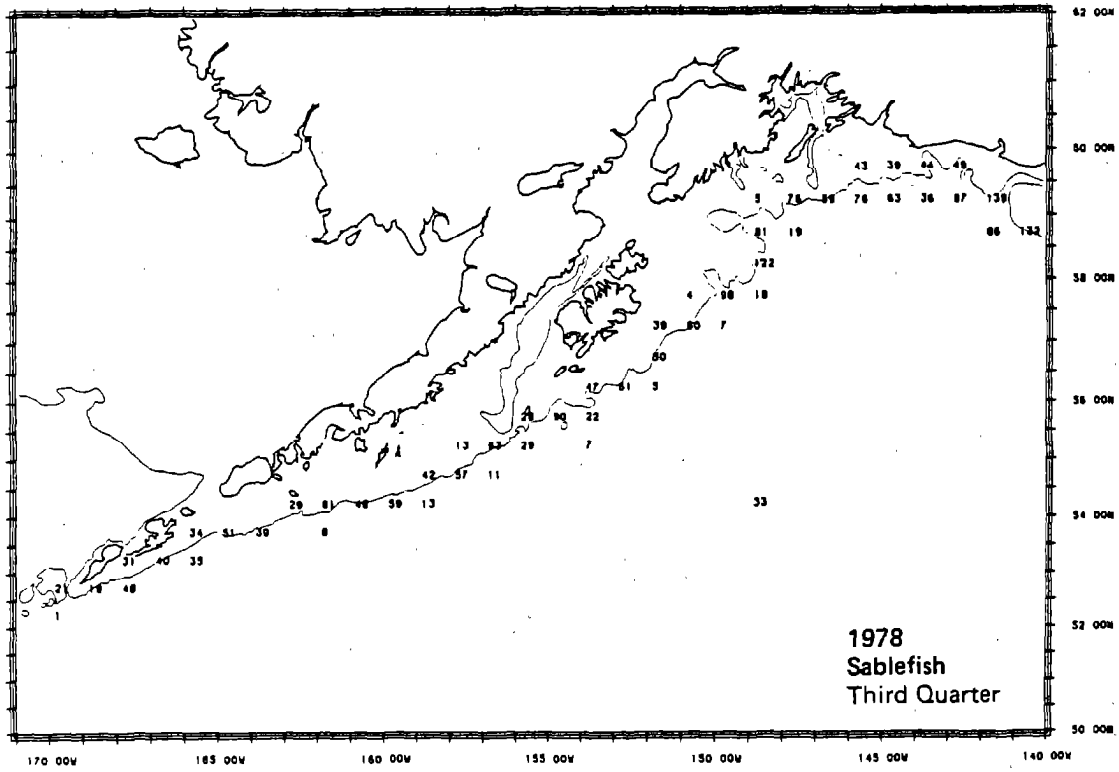


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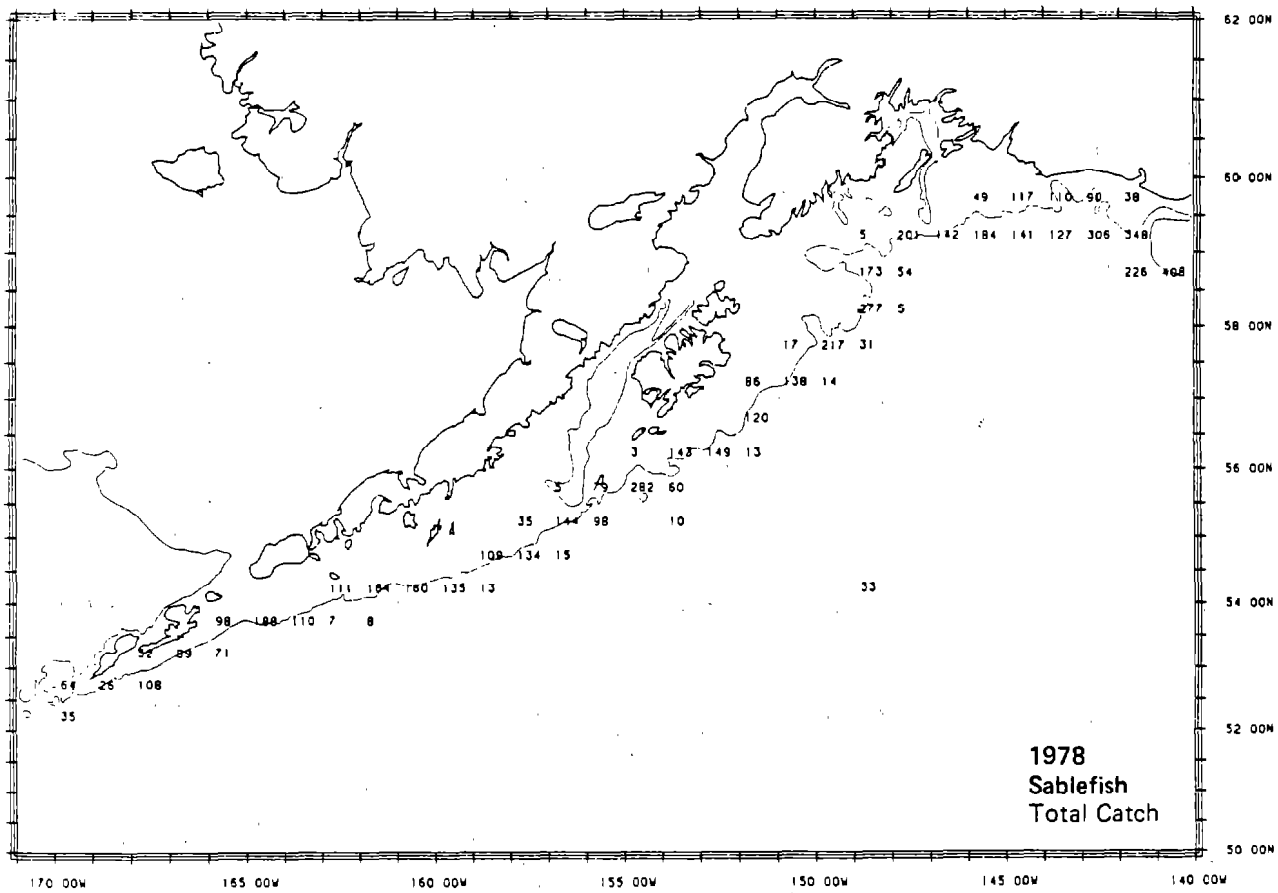


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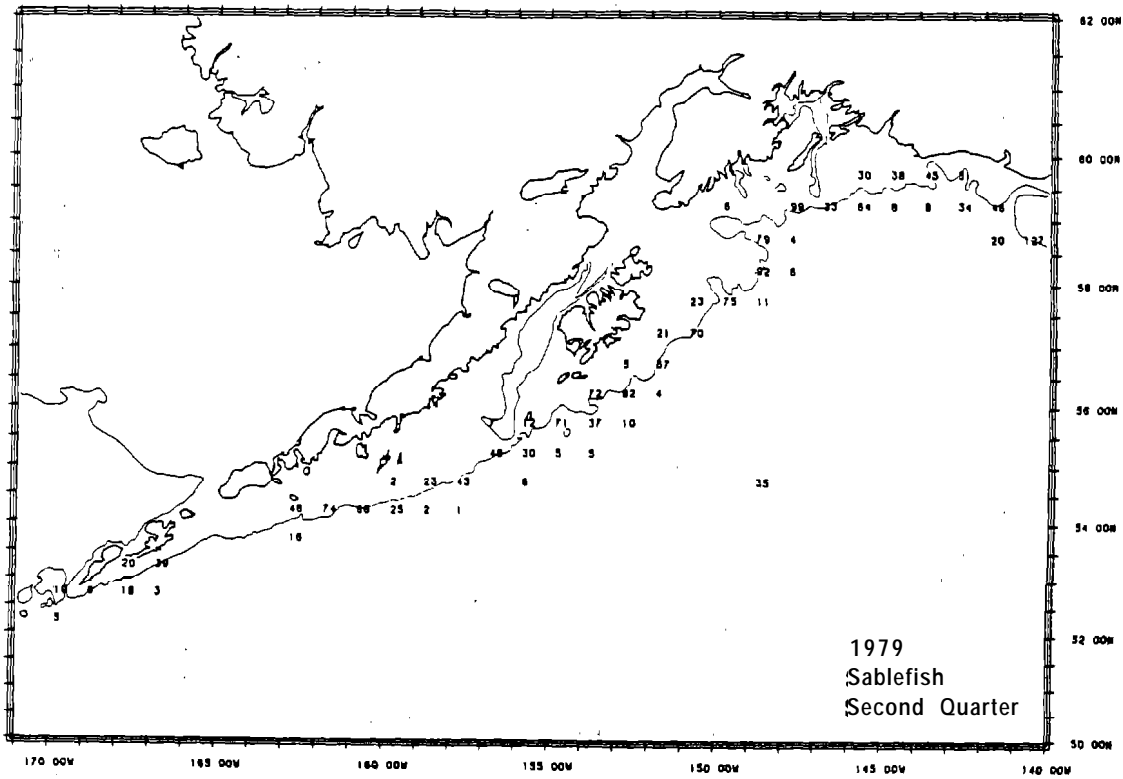
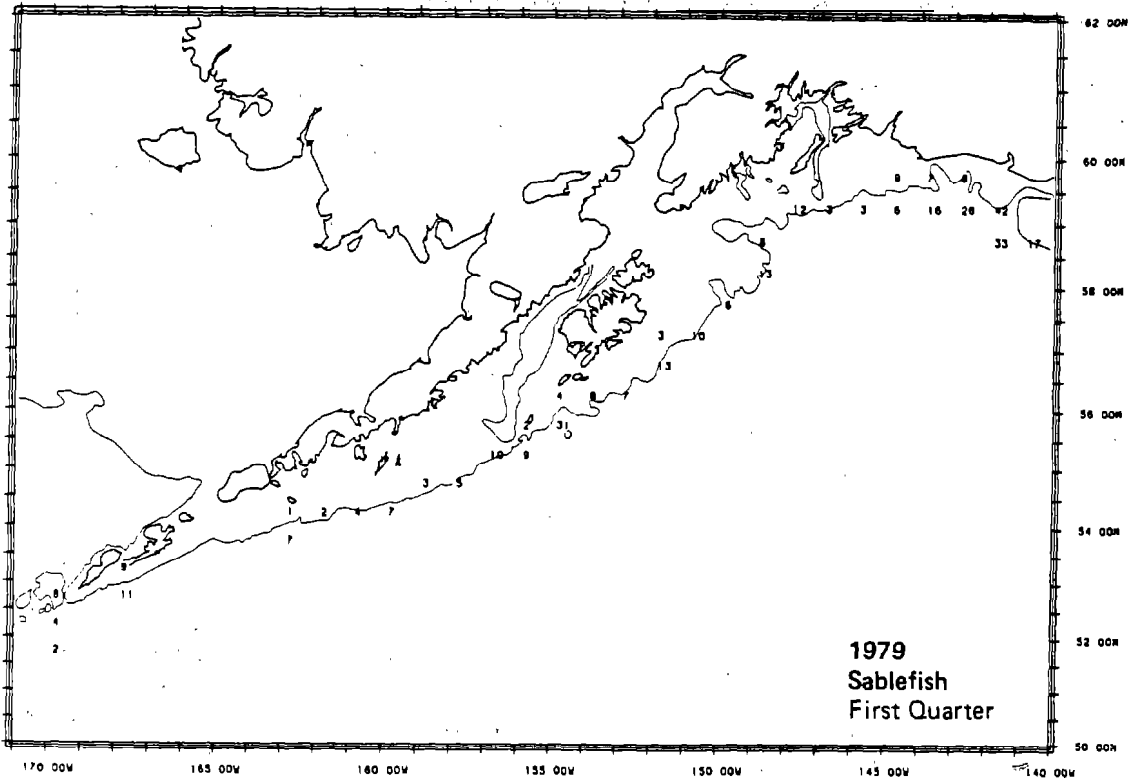


Figure 4 .--Continued.

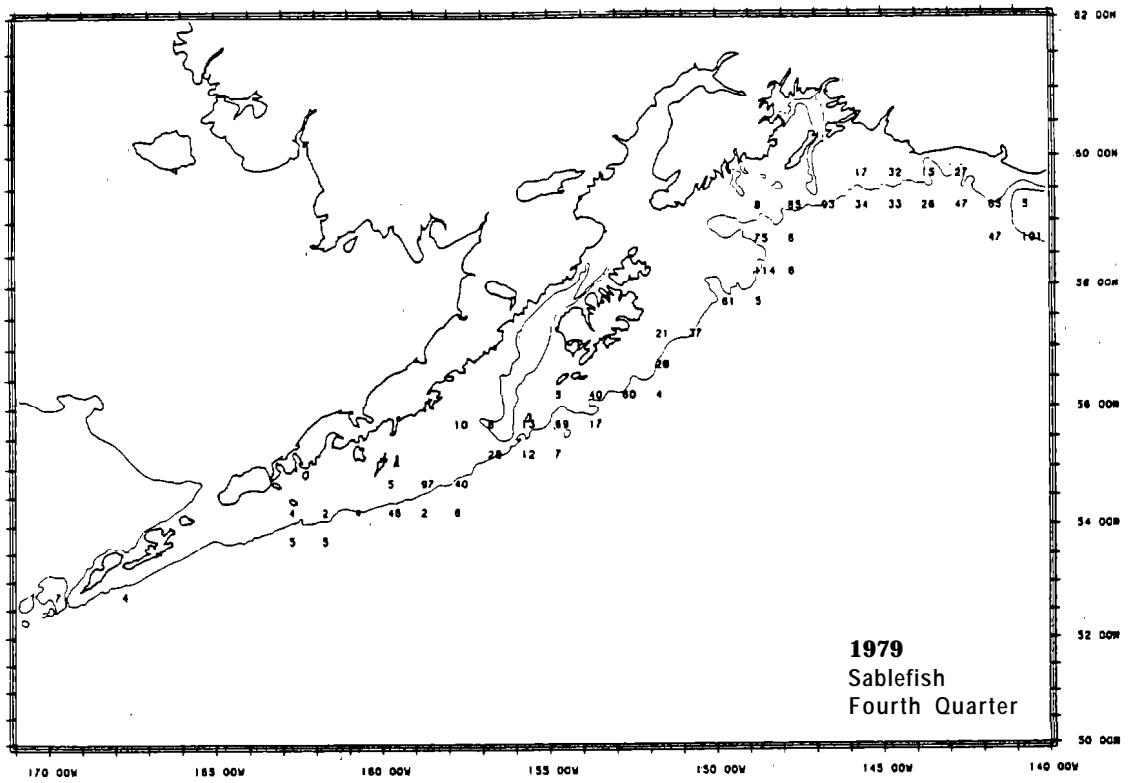
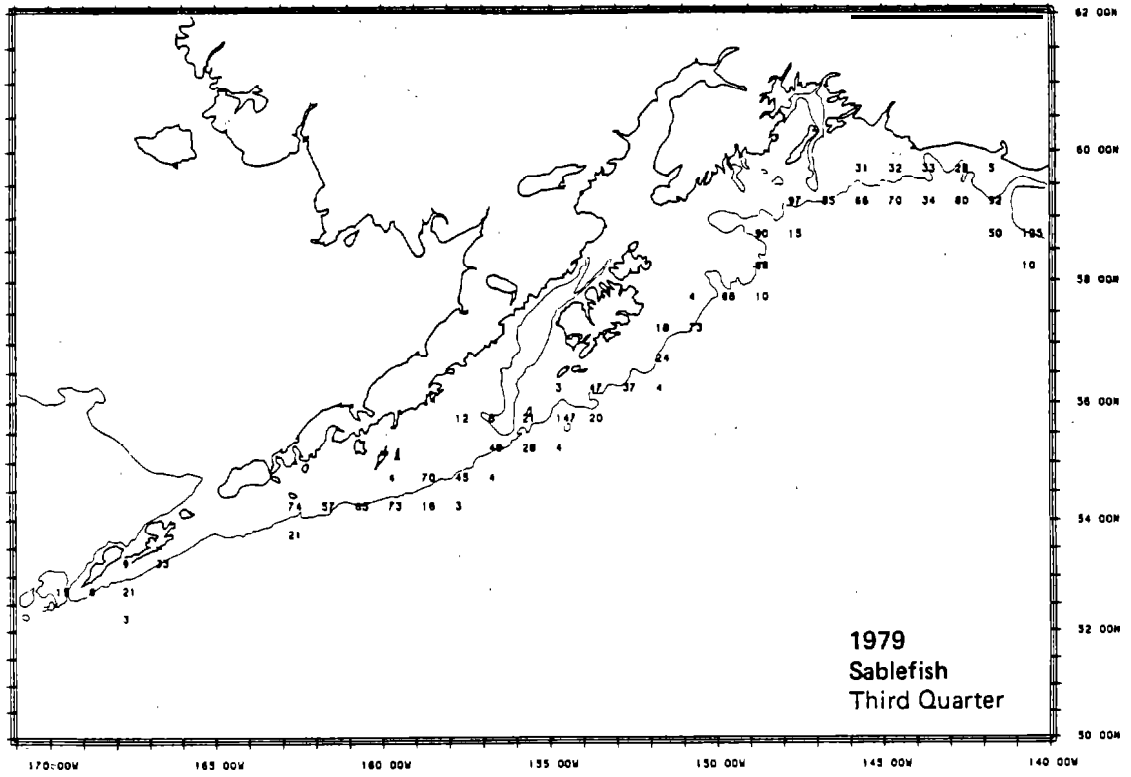


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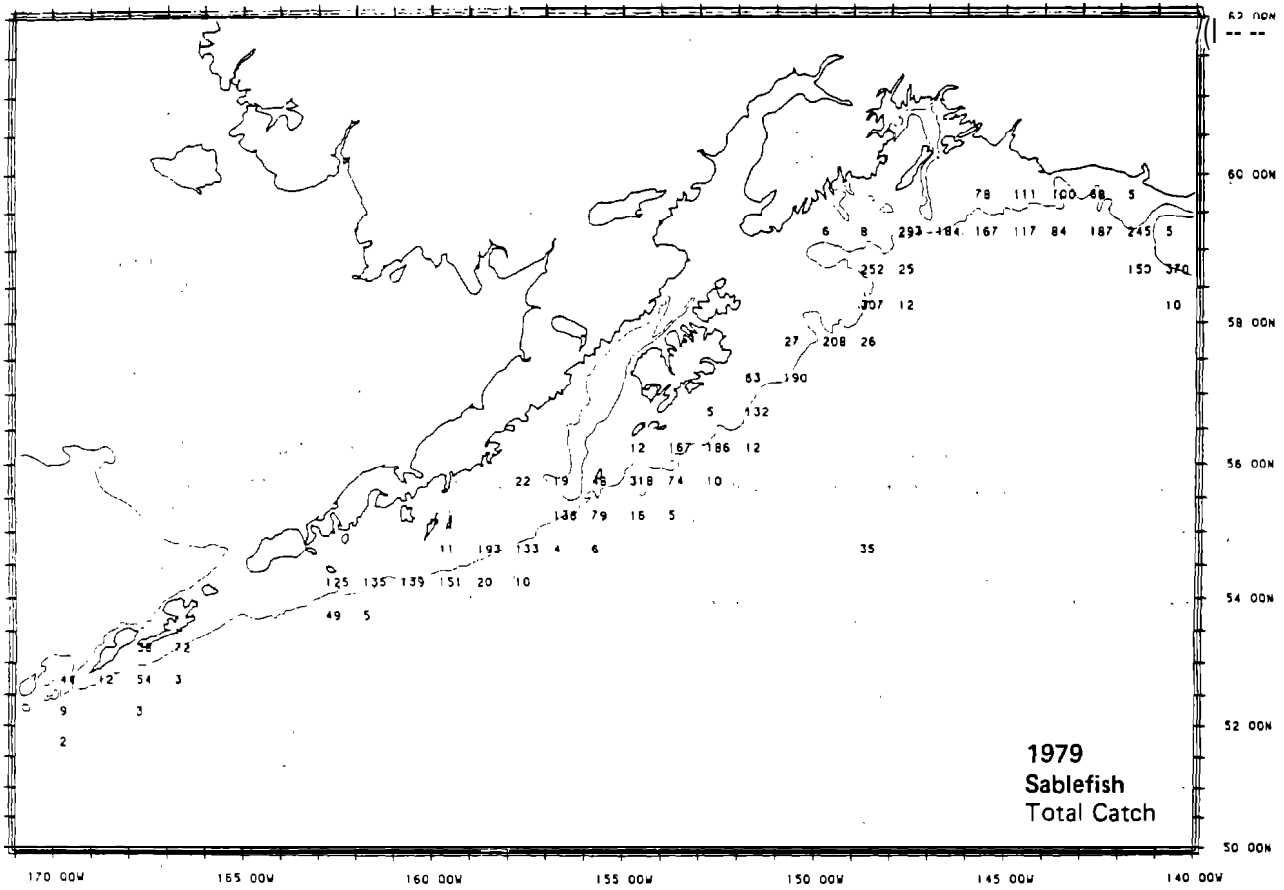


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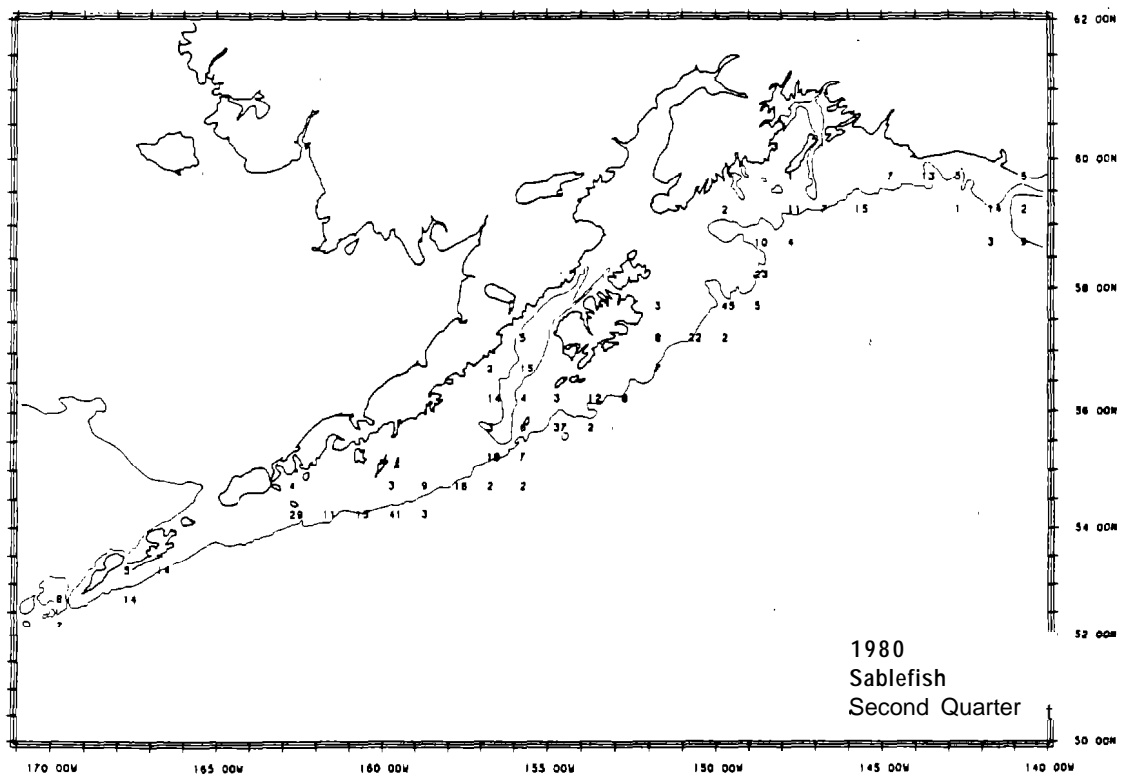
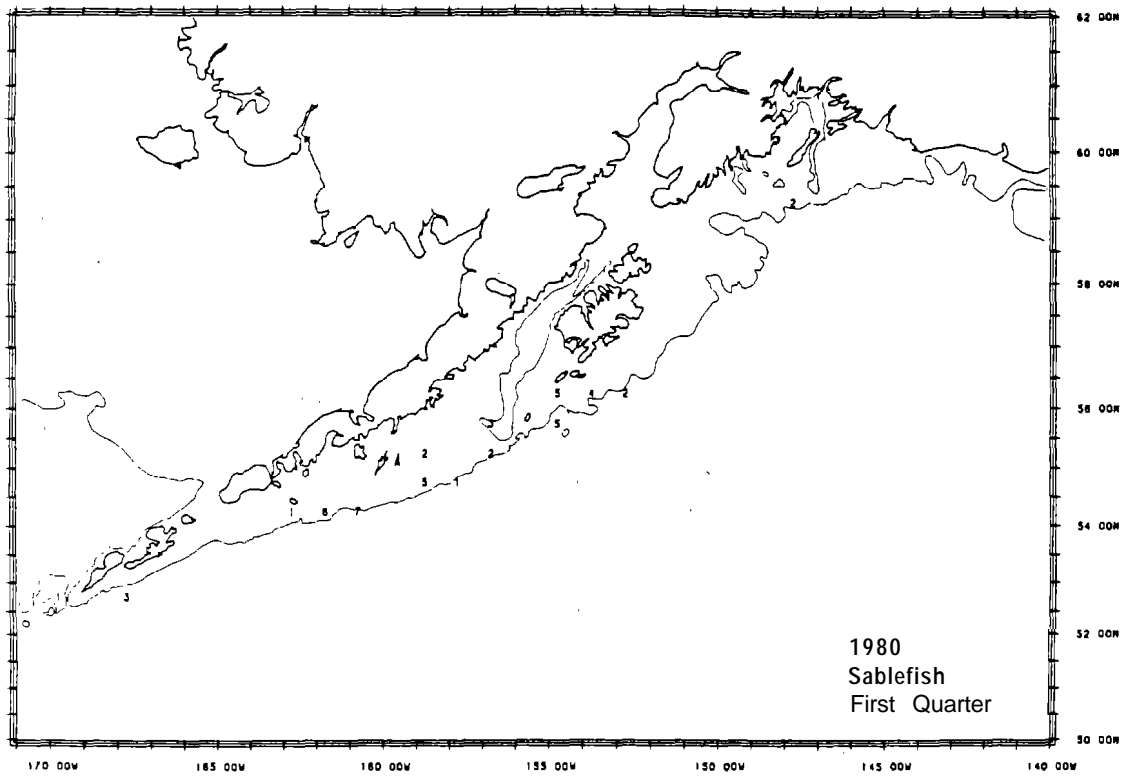


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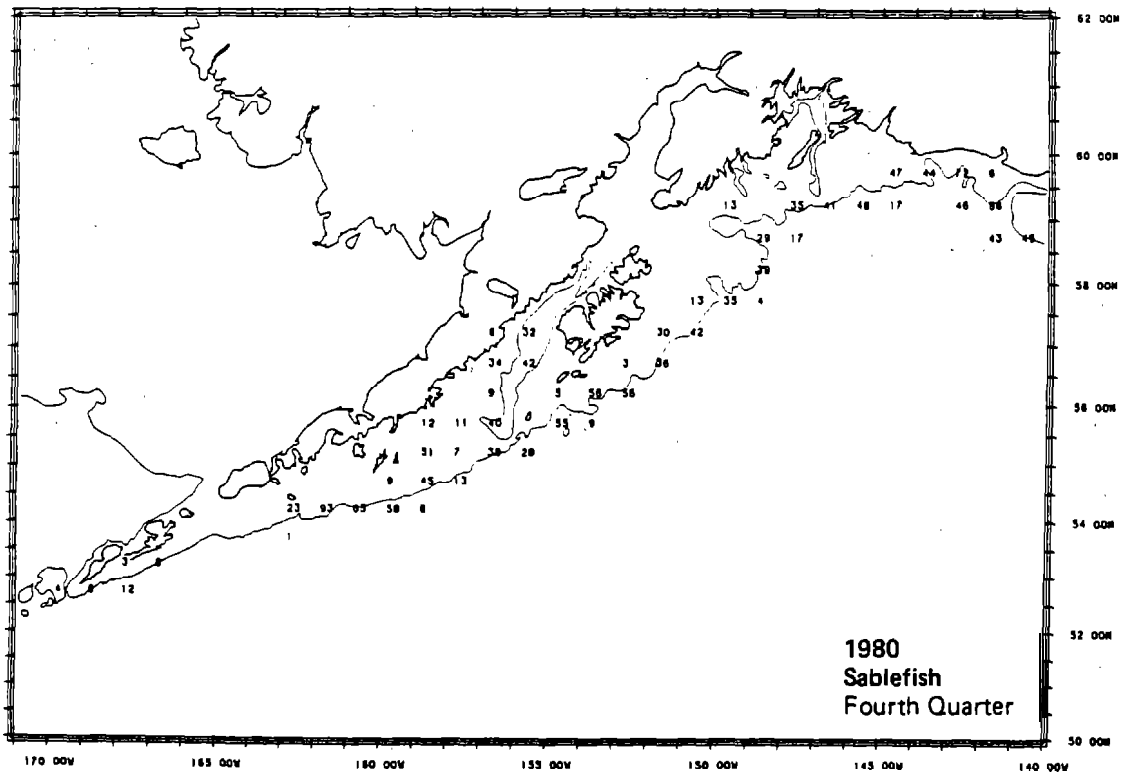
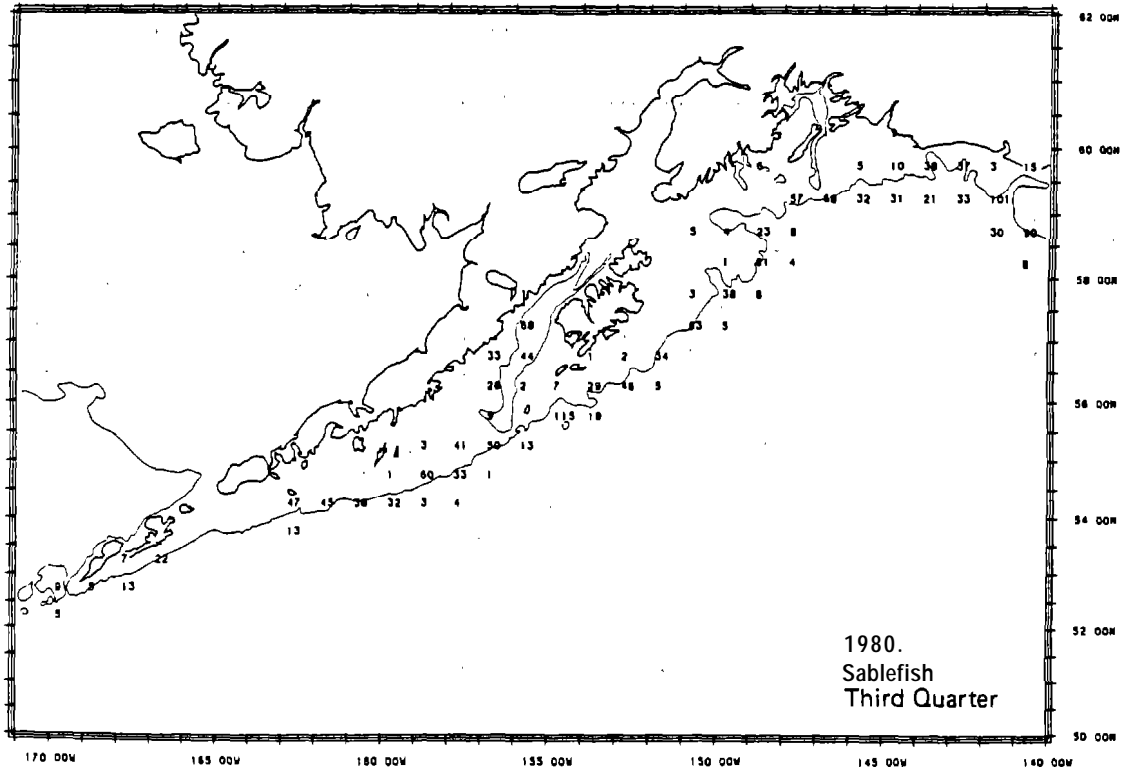


Figure 4. --Continued.

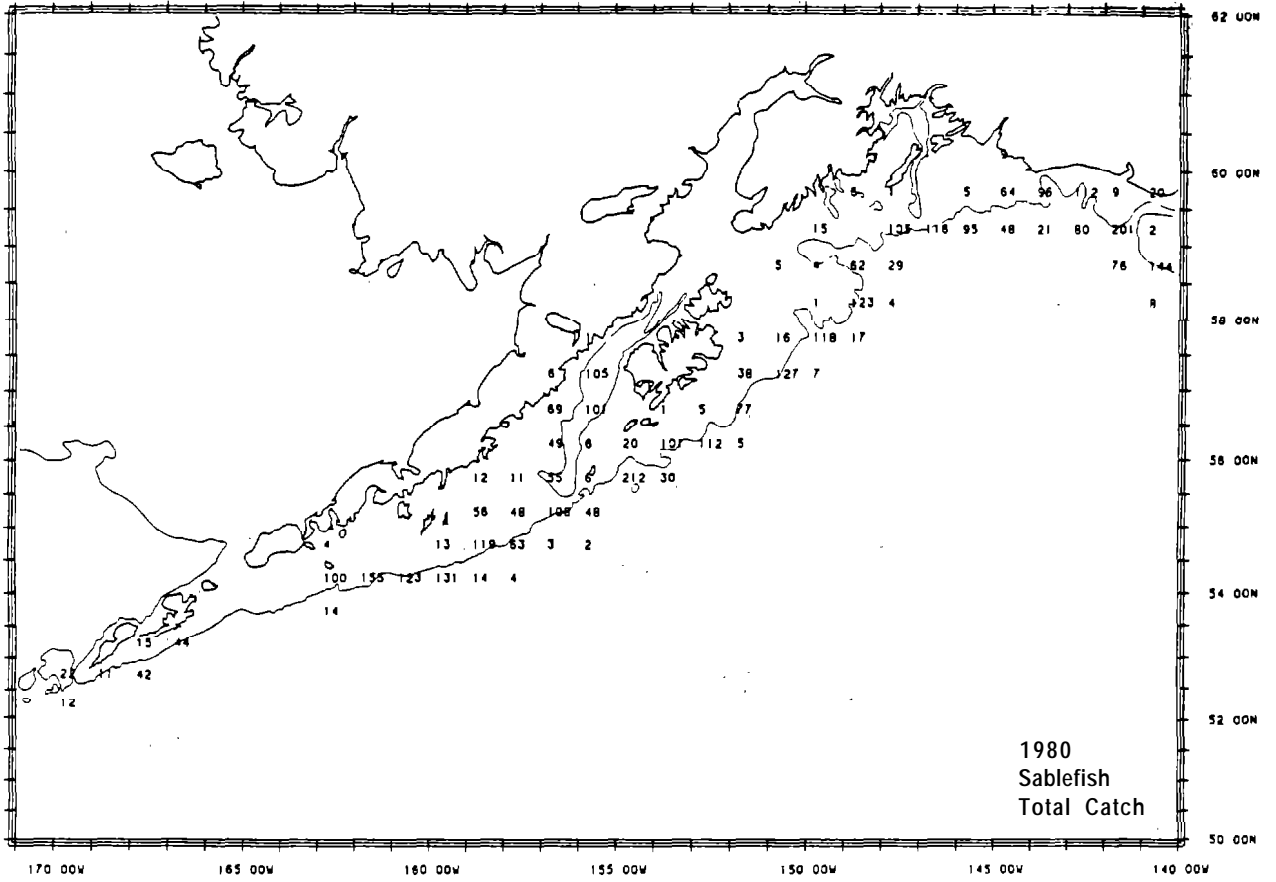


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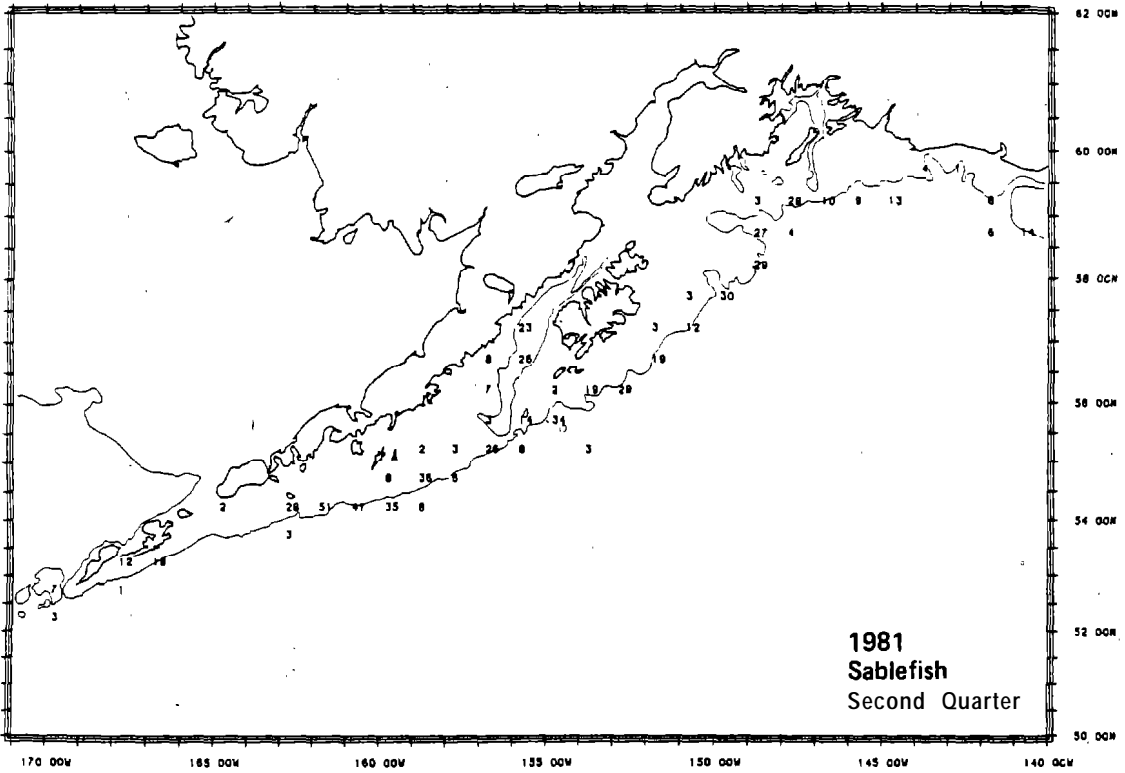
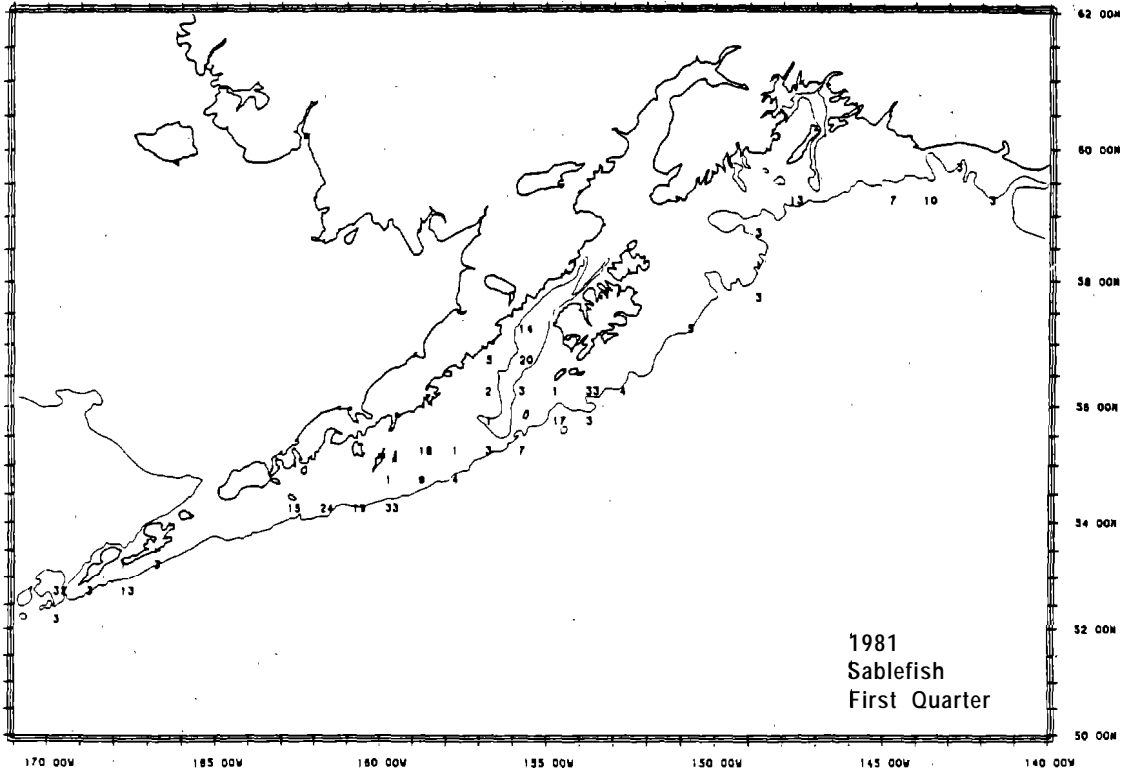


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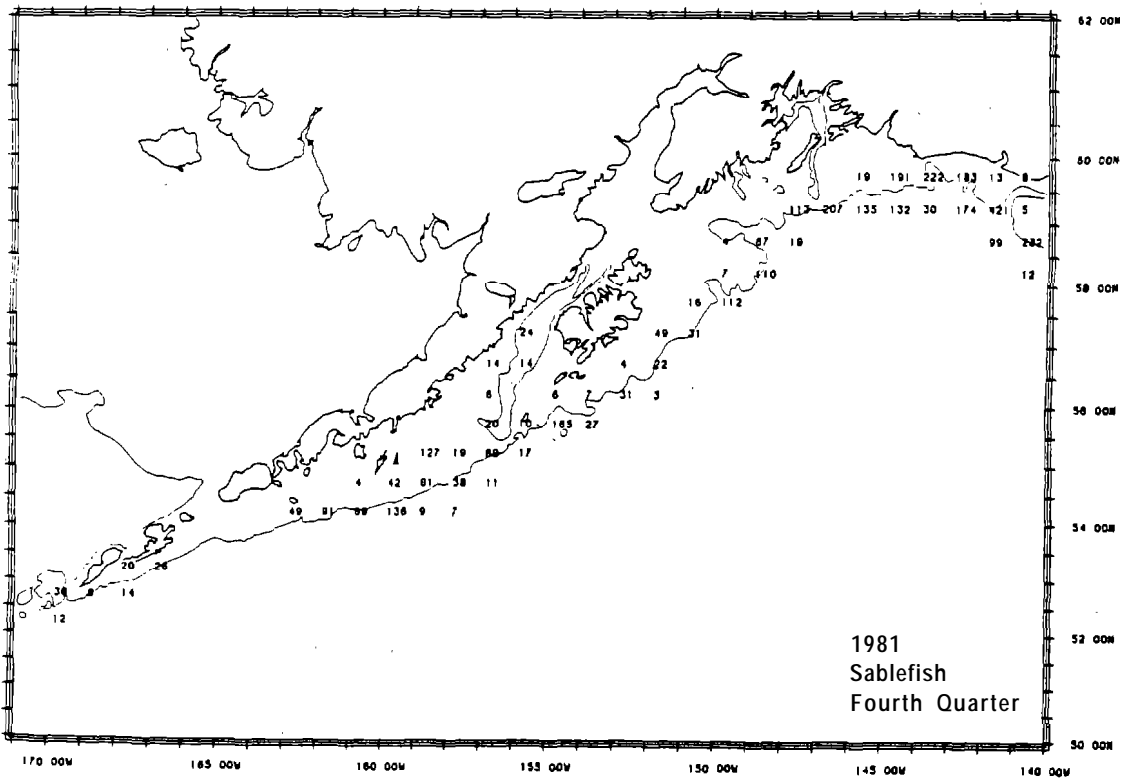
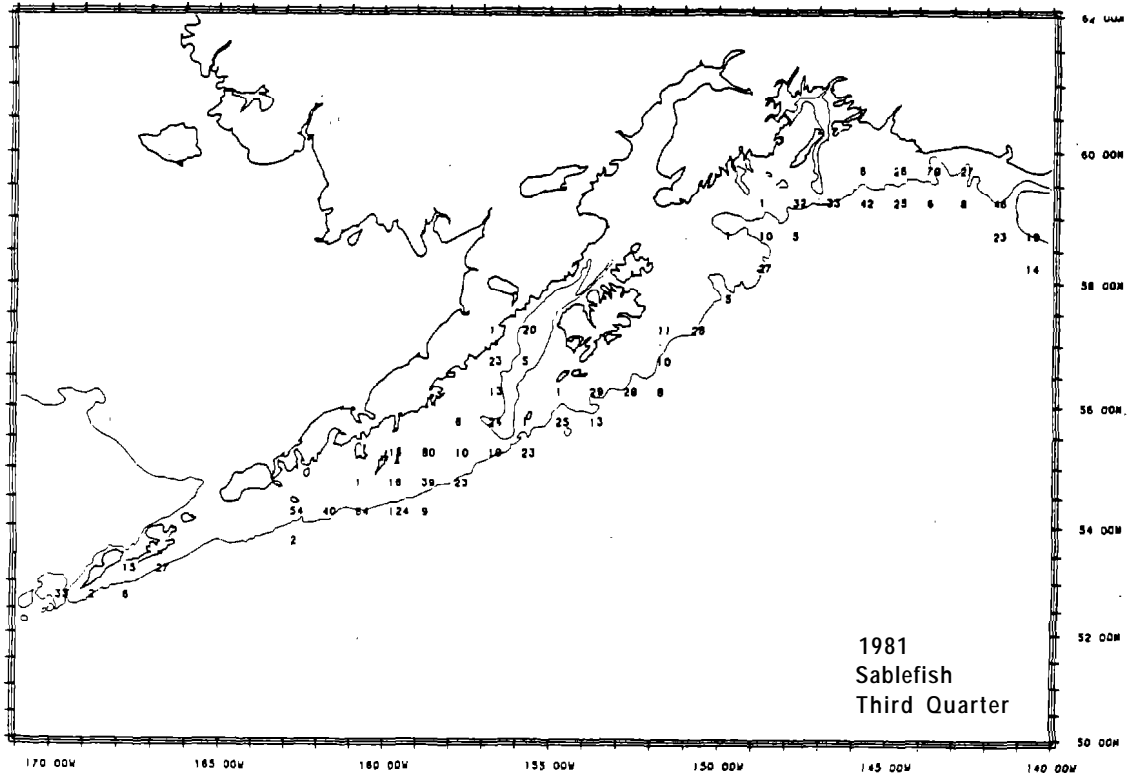


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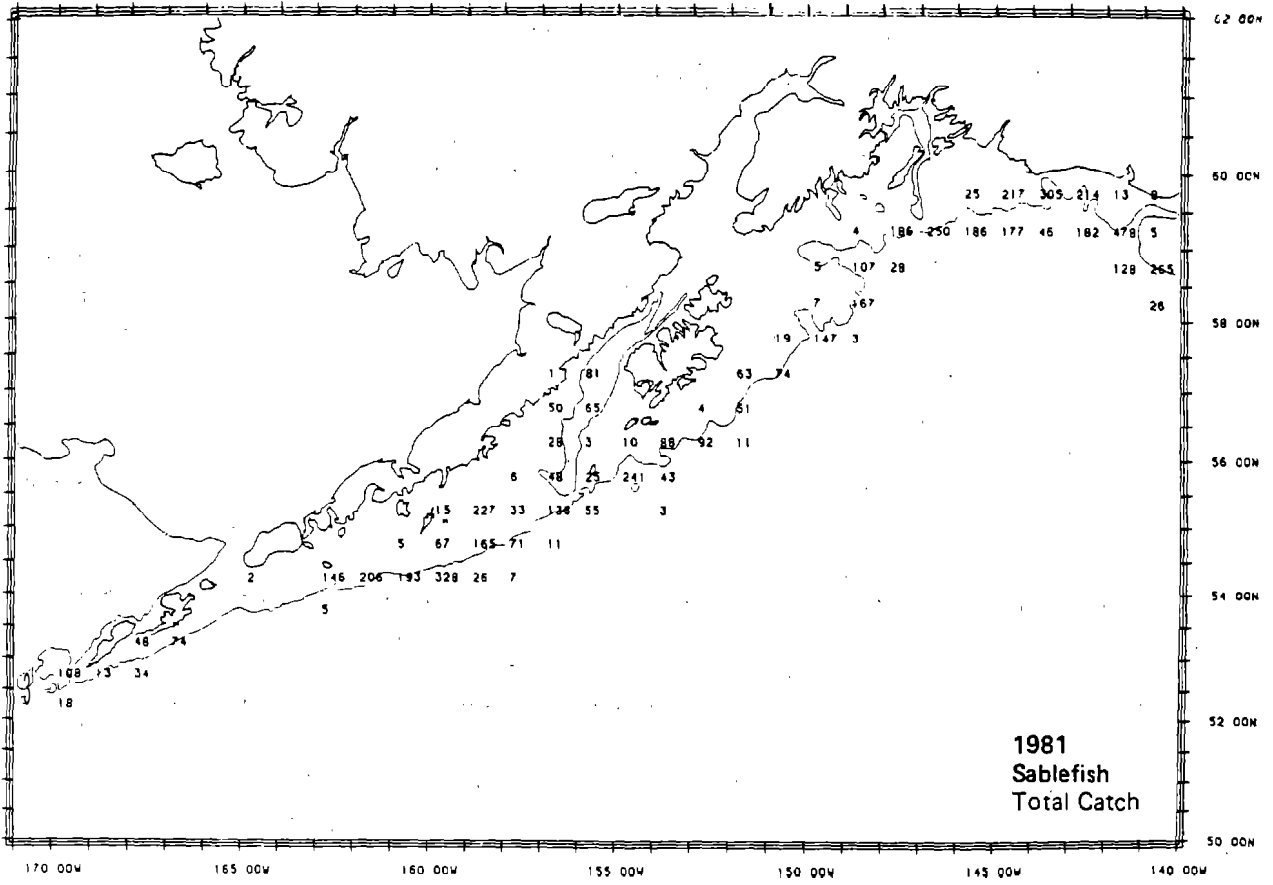


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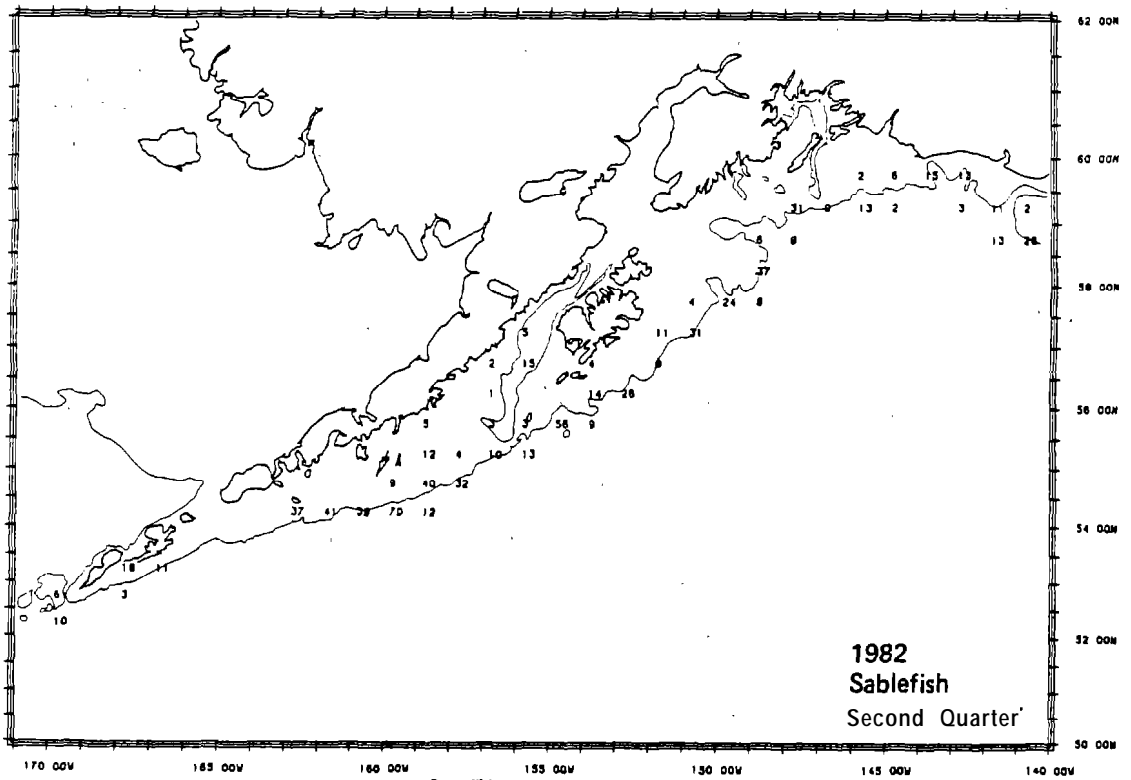
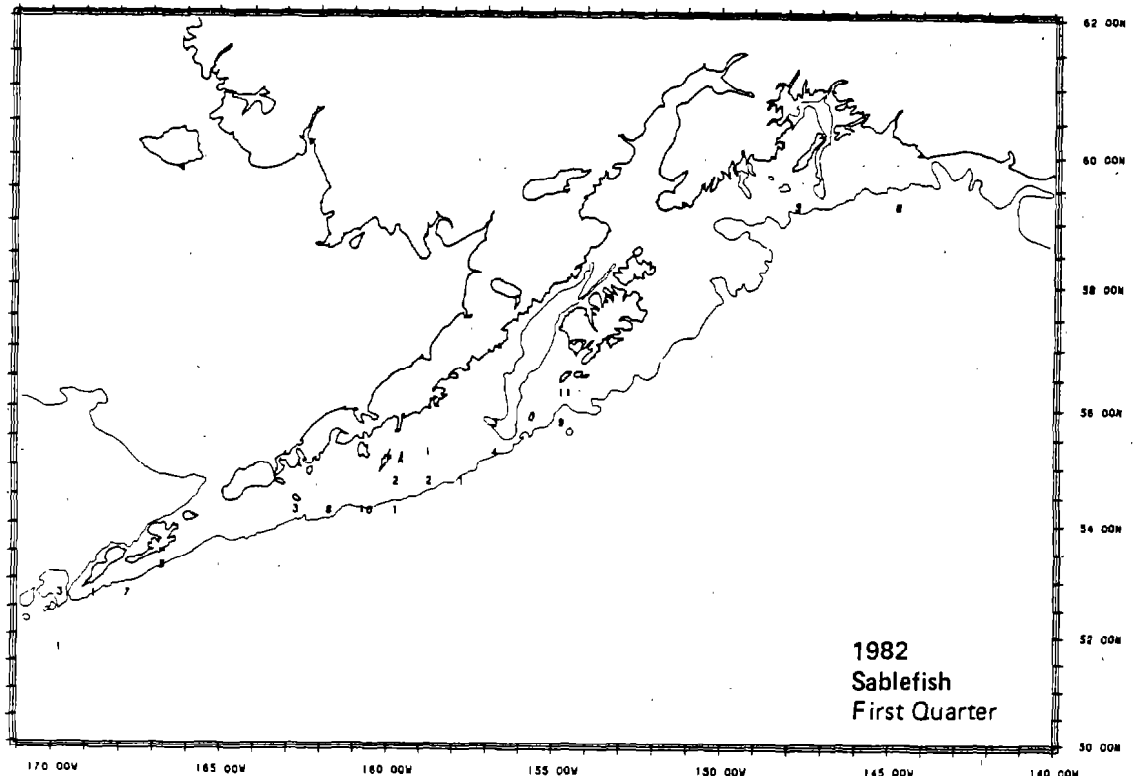


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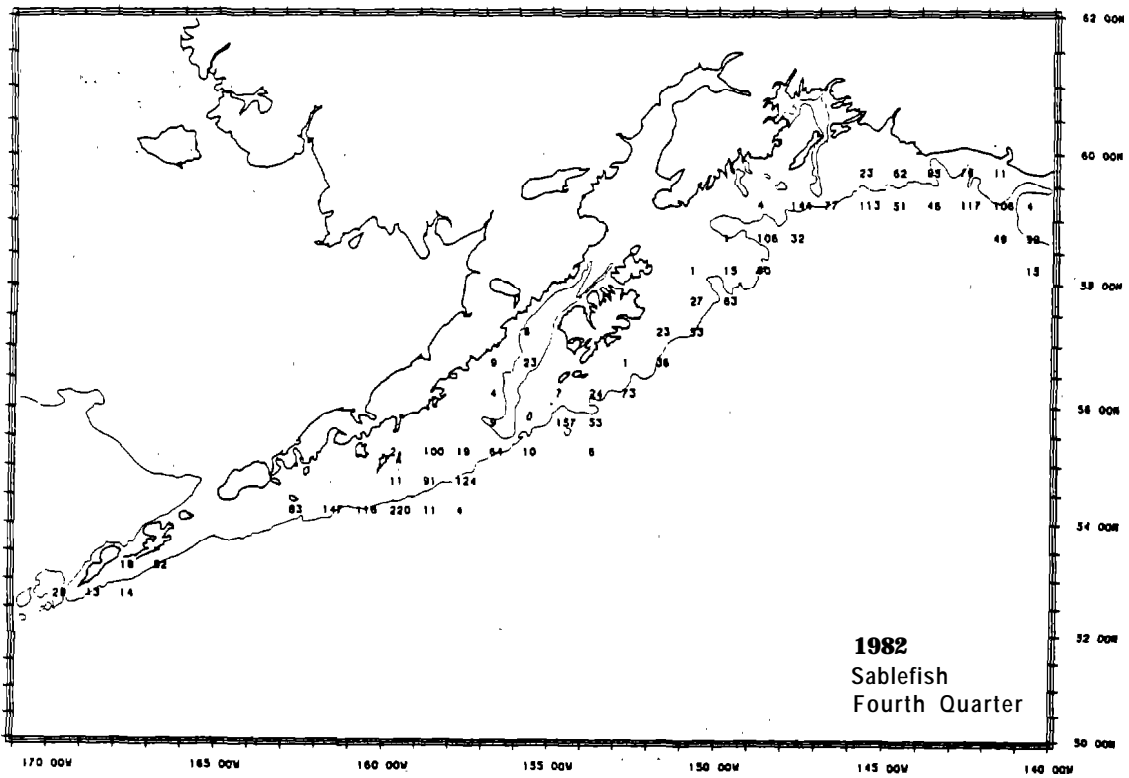
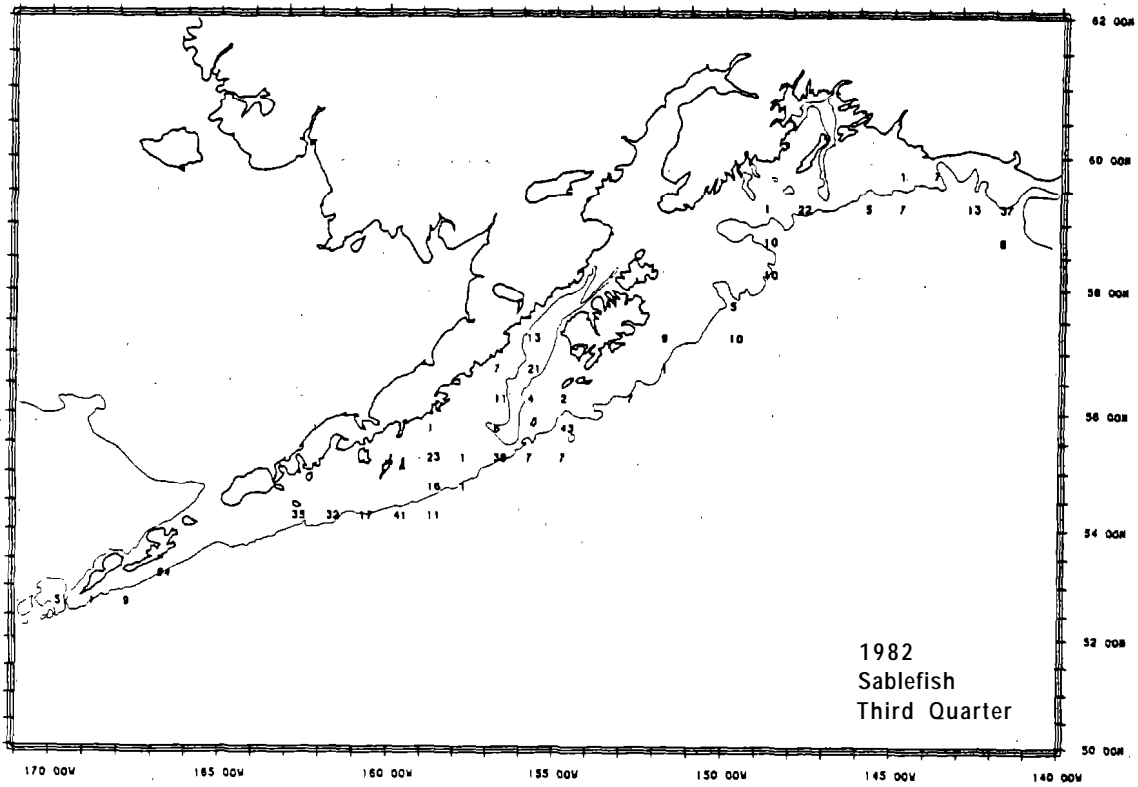


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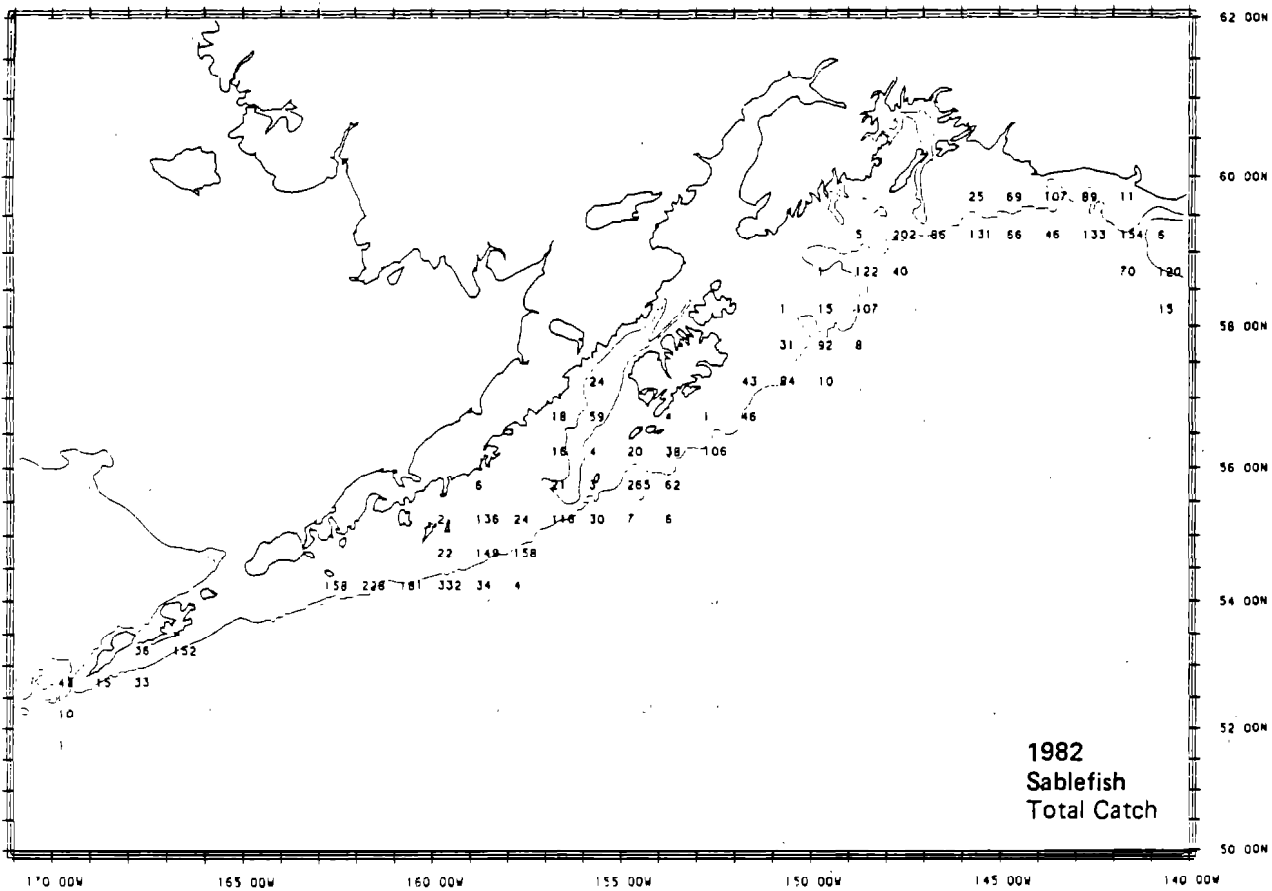


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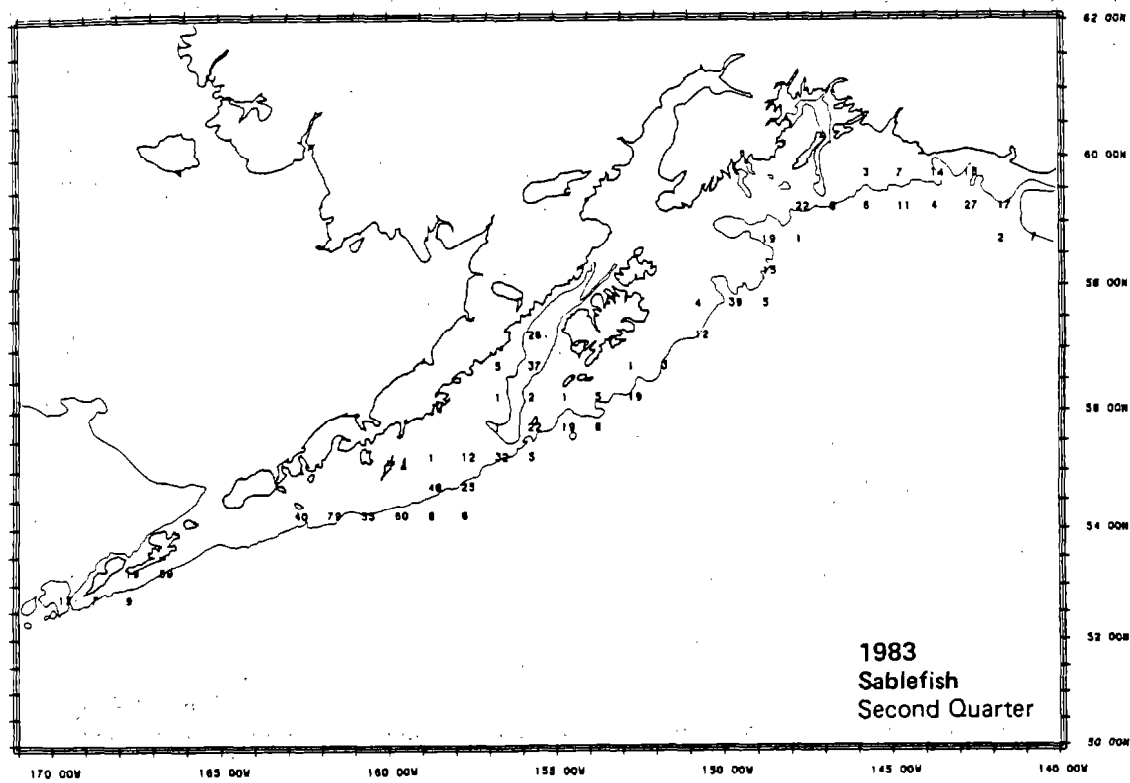
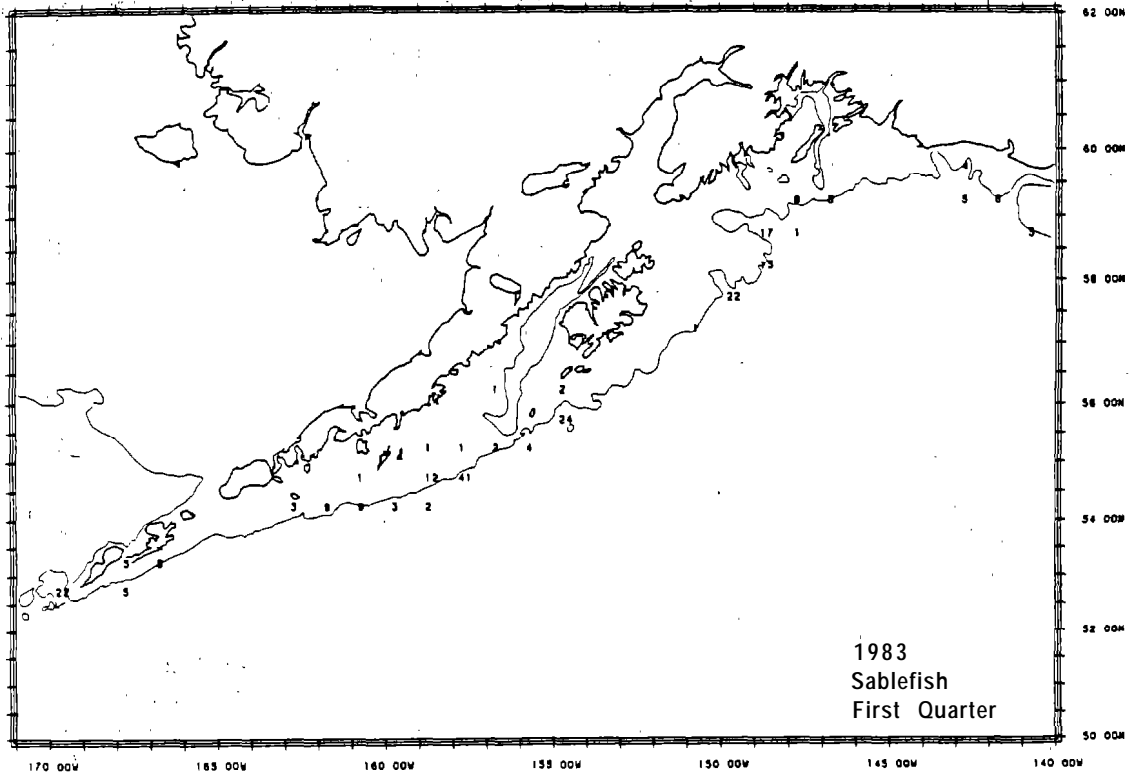


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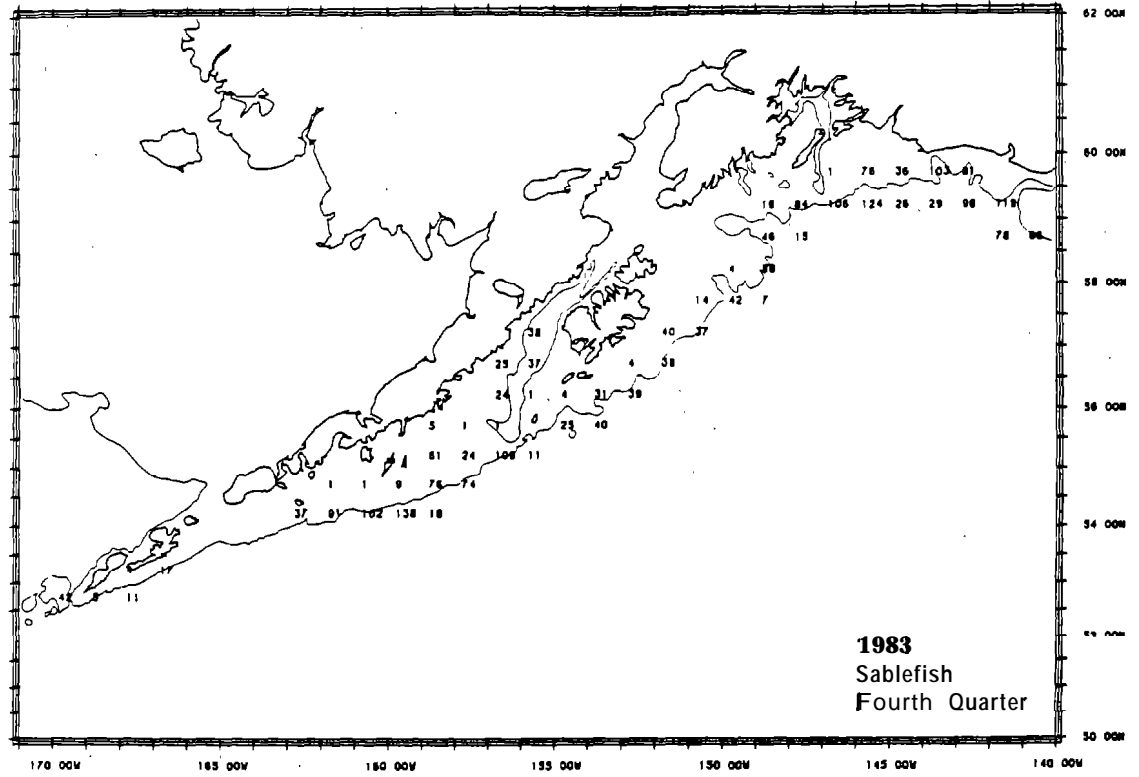
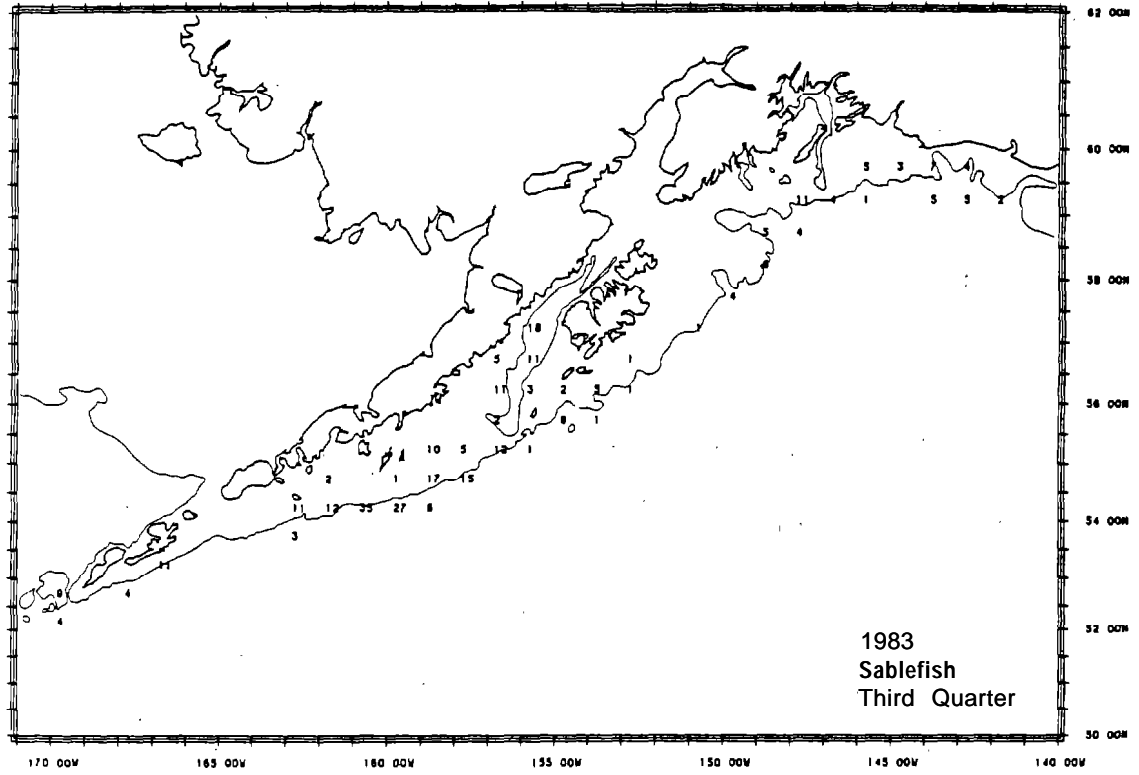


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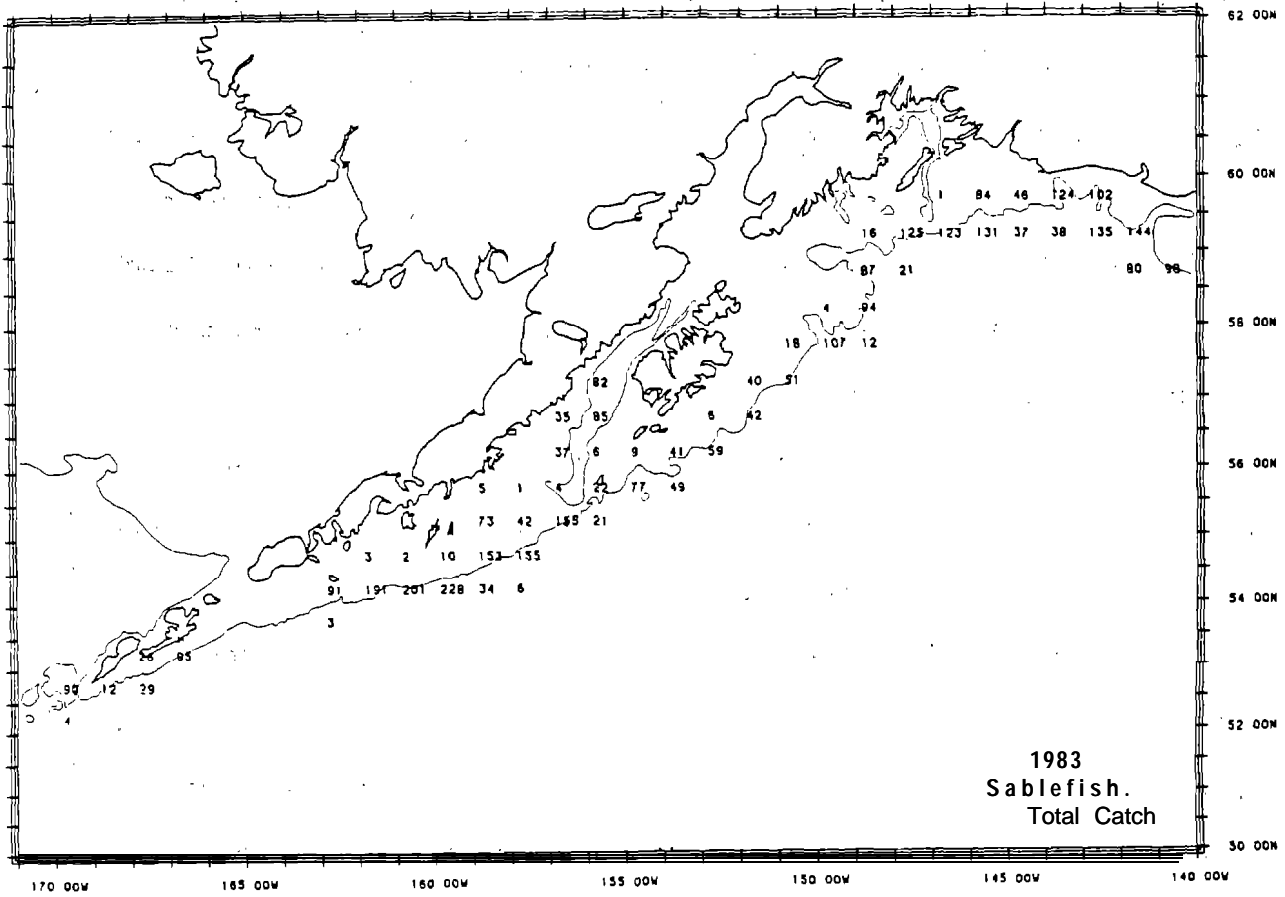


Figure 4. --Continued.

The central Gulf (long. **140-150°** W) showed seasonally high catches relative to other areas. A specific area that yielded relatively high total quarterly and annual catches lay on the east side of Portlock Bank (Fig. 1). The area directly east of Chirikof Island was relatively productive also, but was geographically small in comparison to the Sanak-Shumagin Islands region that have recently grown in importance.

Caution should be used in interpreting post-1979 catch data since apparent seasonal effects may have been due to a fishing strategy directed primarily at Pacific cod, and possibly combined with an attempt near year's end to harvest additional sablefish allocations usually released in the fall. Seasonal, depth, and area closures also determined the extent of the Japanese fishery for sablefish.

Catch per unit effort of sablefish from observer data collected aboard Japanese longliners show that the relative abundance of sablefish was highest when depths averaged greater than than 500 m, and that the amount of fishing effort expended in 300-499 m was very small (Table 6). Sablefish catches from waters shallower than 300 m were probably taken as bycatch in the Pacific cod fishery. For purposes of this report it is assumed that effort directed to capture sablefish was restricted to waters deeper than 500 m.

Catch rates of sablefish resulting from sablefish-directed fishing effort were similar in all INPFC areas during **1978** and 1979 (Table 7), with the exception of low catches in the Chirikof area in 1978 and the Shumagin area in 1979. Catch rates generally increased Gulf-wide in 1980 and the trend continued in the Chirikof and Kodiak INPFC areas during **1981**. By **1982** CPUE had peaked in all areas, and it began decreasing in **1983**. The low overall CPUE value for **1981** in the Yakutat INPFC area was

Table 6.--Annual catch per unit effort of sablefish (metric tons per 1,000 'hooks) and average weight per fish (kilograms) realized by Japanese longliners by 100-meter depth intervals and by International North Pacific Fisheries Commission (INPFC) areas for the years 1978-83.

Year	Depth (m)	INPFC Area									
		Shumagin		Chirikof		Kodiak		Yakutat		Combined	
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.
1978	100-199	0.018	2.7	0.005	1.8	NS ^a		NS		0.010	2.3
	200-299	0.004 ^b	1.0	0.008	2.1	NS		NS		0.008	2.0
	500-599	0.220 ^b	3.5	0.210	3.1	0.320	3.0	0.124 ^b	3.1	0.249	3.1
	600-699	0.243	3.3	0.203	2.9	0.270	3.2	0.290	3.1	0.259	3.1
	700-799		NS	0.232 ^b	3.4	0.197	3.0	0.166	3.0	0.188	3.0
	800-899		NS		NS	0.141	3.4	0.216 ^b	2.9	0.167	3.2
	900-999		NS		NS		NS	0.221 ^b	2.8	0.221 ^b	2.8
1979	100-199	0.007	1.5	0.016	1.3	0.013	1.3	0.014 ^b	1.1	0.012	1.3
	200-299	0.004	2.1	0.038	1.4	0.048 ^b	1.1		NS	0.024	1.4
	300-399		NS	0.258 ^b	3.4	0.075 ^b	2.0		NS	0.161	2.9
	400-499		NS	0.063 ^b	2.8	0.048 ^b	3.0		NS	0.059 ^b	2.8
	500-599	0.135	3.5	0.203	2.9	0.209	2.9	0.243	2.5	0.186	2.8
	600-699	0.143	3.4	0.224	3.0	0.222	2.8	0.264	2.8	0.215	2.9
	700-799	0.138	3.1	0.165	2.9	0.232	3.1	0.259	2.8	0.213	3.0
	800-899		NS	0.144 ^b	2.9	0.279	3.1	0.308	3.0	0.291	3.0
900-999	0.194 ^b	3.3		NS		NS	0.281	3.2	0.266	3.2	
1980	100-199	0.014	1.4	0.052	1.4	0.129	1.3		NS	0.044	1.4
	200-299	0.021	1.6	0.039	1.6	0.017	1.2		NS	0.033	1.5
	300-399	0.054 ^b	1.8	0.028 ^b	1.5		NS		NS	0.042 ^b	1.7
	400-499		NS		NS		NS	0.148 ^b	1.9	0.148 ^b	1.9
	500-599	0.355	1.8	0.300	2.4	0.393 ^b	1.7	0.240	2.0	0.311	2.0
	600-699	0.211	2.2	0.208 ^b	2.4	0.314	2.5	0.318 ^b	1.9	0.253	2.3
	700-799	0.358 ^b	1.8		NS	0.387	2.8	0.239	2.5	0.336	2.4
	800-899		NS		NS	0.296 ^b	2.6		NS	0.296 ^b	2.6

Table 6.--Continued.

Year	Depth (m)	INPFC Area									
		Shumagin		Chirikof		Kodiak		Yakutat		Combined	
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.
1981	100-199	0.072	1.9	0.054	1.8	0.107	1.6		NS	0.065	1.8
	200-299	0.140	1.9	0.080	2.0	0.032 ^b	2.5		NS	0.095	2.0
	500-599	0.261	2.4	0.547 ^b	1.9	0.671 ^b	2.4	0.270 ^b	2.1	0.390	2.3
	600-699	0.254	2.1	0.394	2.0	0.424	2.1	0.171 ^b	1.4	0.356	2.0
	700-799	0.203	2.0		NS		NS	0.200 ^b	2.2	0.202	2.1
	800-899	0.220 ^b	2.8		NS		NS		NS	0.220	2.8
1982	100-199	0.053	2.1	0.018	1.6	0.037	1.8	0.003	0.5	0.030	1.8
	200-299	0.090	2.4	0.099	2.3		NS		NS	0.094	2.4
	400-499	0.379	2.0		NS		NS		NS	0.379	2.0
	500-599	0.509	2.0	0.482	1.9	0.672	2.1	0.555	2.9	0.544	2.0
	600-699	0.487	2.0	0.504	2.0	0.593	2.1	0.517	2.1	0.518	2.0
	800-899	0.334 ^b	2.0	0.318	2.3		NS		NS	0.324	2.2
1983	0-99	0.006 ^b	2.6		NS		NS		NS	0.006 ^b	2.6
	100-199	0.068	2.1	0.034	1.9	0.037	1.8		NS	0.047	2.0
	200-299	0.373	2.3	0.077	2.1	0.184	2.3	0.044 ^b	1.8	0.106	2.2
	300-399	0.202 ^b	2.2		NS	0.199	2.6		NS	0.202 ^b	2.4
	400-499	0.488 ^b	2.0	0.424 ^b	2.0		NS		NS	0.460 ^b	2.0
	500-599	0.372	2.4	0.426 ^b	1.9	0.449 ^b	2.6	0.484 ^b	2.4	0.410	2.3
	600-699	0.451	2.1	0.400 ^b	2.1	0.430 ^b	2.0	0.446	2.3	0.443	2.2
	700-799		NS		NS		NS	0.396	2.3	0.396	2.3

^a NS = No sample

^b Relatively small sample

Source : U.S. observer data provided by Jerald Berger, Resource Ecology and Fisheries Management Division, Northwest and Alaska Fisheries Center, 7600 Sand Point Way NE, Bin C15700, Bldg. 4, Seattle, WA 98115.

Table 7.--Annual catch per unit effort of sablefish (metric tons per 1,000 hooks) and average weight per fish (kilograms) realized by Japanese longliners targeting sablefish in depths greater than 500 m and those fishing in shallower waters in- four Gulf of Alaska International North Pacific Fisheries Commission (INPFC) areas, 1978-83.

Year	Depth (m)	INPFC Area									
		Shumagin		Chirikof		Kodiak		Yakutat		Combined	
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.
1978	100-499	0.017	2.6	0.005	1.9	NS ^a		NS		0.009	2.3
	500-999	0.239	3.3	0.209	3.0	0.241	3.1	0.231	3.0	0.235	3.1
1979	100-499	0.006	1.6	0.028	1.6	0.033	1.4	0.014 ^b	1.1	0.020	1.6
	500-999	0.140	3.3	0.202	3.0	0.226	2.8	0.268	2.8	0.215	2.9
1980	100-499	0.018	1.5	0.044	1.5	0.061	1.3	0.148 ^b	1.9	0.039	1.5
	500-899	0.286	1.9	0.274	2.4	0.348	2.4	0.253	2.1	0.298	2.2
1981	100-499	0.078	1.9	0.059	1.8	0.099	1.6	NS		0.069	1.8
	500-899	0.238	2.2	0.419	2.0	0.490	2.2	0.194	1.8	0.333	2.1
1982	100-499	0.086	2.1	0.024	1.8	0.037	1.8	0.003 ^b	0.5	0.045	2.0
	500-899	0.496	2.0	0.483	2.0	0.641	2.1	0.527	2.2	0.529	2.0
1983	0-499	0.078	2.1	0.043	2.0	0.164	2.3	0.044 ^b	1.8	0.059	2.0
	500-799	0.397	2.3	0.403	2.0	0.439	2.3	0.441	2.3	0.429	2.3

^a NS = No sample

^b Relatively small sample

Source : U.S. observer data provided by Jerald Berger, Resource Ecology and Fisheries Management Division, Northwest and Alaska Fisheries Center, 7600 Sand Point Way NE, Bin C15700, Bldg. 4, Seattle, WA '98115.

probably caused by weak observer coverage rather than an actual decrease in sablefish abundance in all areas. Catch rates were highest in the 500-599 and 600-699 m depth intervals during those years, with some exceptions that are of questionable importance because the data were based on relatively small samples within some depth zones (Table 7). Average fish weight was highest during 1978 and 1979. Small fish were most evident in 1980, and the higher catch rates of 1982 and 1983 were based on catches of relatively small fish. INPFC area-specific CPUEs for sablefish and average fish weight by 100 m depth intervals during 3-month periods from **1978** through 1983 are presented in Table 8. The fact that quarterly catch rates reflect considerable variability should not be surprising. The influences of observers' sampling intensity and distribution; area, time and depth-specific regulations; and fishing strategy may all combine to complicate the interpretation of seasonal catch rates.

ACKNOWLEDGMENTS

The author wishes to thank Bruce Gibbs and Jerald Berger of the Resource Ecology and Fisheries Management Division of the Northwest and Alaska Fisheries Center for their assistance in accessing the foreign-reported groundfish data base and for the programming support that facilitated the production of the catch distribution figures.

Table 8.--Quarterly catch per unit effort of sablefish (metric tons per 1,000 hooks) and average weight per fish (kilograms) realized by Japanese longliners in four Gulf of Alaska International North Pacific Fisheries Commission (INPFC) areas and 100-m depth intervals for the years 1978-83.

Year and quarter	Depth (m)	INPFC Area								
		Shumagin		Chirikof		Kodiak		Yakutat		
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	
1978	Q1	500-599	NS ^a		NS		NS		0.059 ^b	2.9
		600-699	0.111 ^b	2.5	0.227	2.5	0.229 ^b	2.8	0.315	3.1
		700-799	NS		NS		0.210 ^b	2.8	0.391 ^b	3.2
	Q2	100-199	0.072 ^b	3.6	0		NS		NS	
		500-599	0.128 ^b	3.2	0.145	3.1	0.440	3.0	NS	
		600-699	0.145	3.3	0.192	3.2	0.237	3.1	0.535 ^b	3.0
		700-799	NS		NS		0.275	3.2	NS	
	Q3	100-199	0.016	2.4	0.004	2.2	NS		NS	
		200-299	NS		0.007	1.8	NS		NS	
		500-599	0.342 ^b	3.7	0.294 ^b	3.2	0.055 ^b	3.1	0.239 ^b	3.2
		600-699	0.233	3.5	0.170 ^b	3.3	0.260	3.5	0.205	2.9
		700-799	NS		0.232 ^b	3.4	0.172	3.2	0.163	3.1
		800-899	NS		NS		0.140 ^b	3.6	0.216 ^b	2.9
		900-999	NS		NS		NS		0.221 ^b	2.8
	Q4	100-199	0.002	1.3	0.006	1.6	NS		NS	
		200-299	0.004 ^b	1.0	0.009	2.6	NS		NS	
		500-599	0.481 ^b	3.7	0.204 ^b	2.5	NS		0.080 ^b	2.8
		600-699	0.448	3.2	0.191 ^b	3.3	0.421 ^b	3.3	0.251	3.4
		700-799	NS		NS		0.247	2.8	0.148	2.8
		800-899	NS		NS		0.142 ^b	3.2	NS	

Table 8.--Continued.

		INPFC Area							
Year and quarter	Depth (m)	Shumagin		Chirikof		Kodiak		Yakutat	
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.
1979 Q1	100-199	0.001	3.6	0.224 ^b	2.9	NS		NS	
	200-299	0.004	2.2	NS		NS		NS	
	600-699	0.443 ^b	3.5	NS		NS		NS	
	900-999	0.194 ^b	3.3	NS		NS		NS	
Q2	100-199	0.002 ^b	1.7	0.004 ^b	0.7	NS		NS	
	300-399	NS		0.258 ^b	3.4	NS		NS	
	500-599	NS		0.232 ^b	2.8	0.227 ^b	3.1	0.154 ^b	2.2
	600-699	0.067 ^b	3.2	0.245	2.8	0.273	3.0	0.340	2.8
	700-799	NS		0.139	3.3	0.232	3.0	0.285 ^b	2.7
	800-899	NS		NS		NS		0.194 ^b	2.3
	900-999	NS		NS		NS		0.246 ^b	2.4
Q3	100-199	0.009 ^b	1.9	0.025	1.5	0.010 ^b	1.8	0.014 ^b	1.1
	200-299	NS		0.054	1.5	NS		NS	
	400-499	NS		0.063 ^b	2.8	NS		NS	
	500-599	0.135	3.5	0.163	3.1	0.162 ^b	2.6	0.137 ^b	2.7
	600-699	0.144	3.4	0.168	3.1	0.174	2.8	0.133 ^b	2.6
	700-799	0.138	3.1	0.154	3.0	0.241	3.2	0.210	2.8
	800-899	NS		0.144 ^b	2.9	0.147 ^b	3.6	0.297	3.0
	900-999	NS		NS		NS		0.286	3.4
	Q4	100-199	0.070 ^b	1.3	0.013	1.2	0.016	1.1	NS
200-299		0.005 ^b	1.6	0.029	1.4	0.048	1.1	NS	
300-399		NS		NS		0.075 ^b	2.0	NS	
400-499		NS		NS		0.048 ^b	3.0	NS	
500-599		NS		NS		0.212	2.1	0.300	2.5
600-699		0.296 ^b	3.3	0.435	3.1	0.202	2.6	0.294	2.8
700-799		NS		0.261	2.4	0.223	2.9	0.485	2.9
800-899		NS		NS		0.337 ^b	3.1	0.517 ^b	3.4

Table 8.--Continued.

		INPFC Area								
Year and quarter	Depth (m)	Shumagin		Chirikof		Kodiak		Yakutat		
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	
1980	Q1	100-199	0.002	1.8	0.007	1.5	NS		NS	
		200-299	0.008	1.8	0.024	1.5	0.005 ^b	1.3	NS	
		300-399	NS		0.028 ^b	1.5	NS		NS	
	Q2	100-199	0.002 ^b	1.0	0.012	1.2	0.043 ^b	1.1	NS	
		200-299	NS		0.024	1.3	0.018 ^b	1.0	NS	
		700-799	0.409 ^b	1.9	NS		0.345 ^b	2.5	NS	
	Q3	100-199	0.037	1.4	0.084	1.4	0.259 ^b	1.4	NS	
		200-299	0.204 ^b	1.6	0.078	1.6	0.031 ^b	1.4	NS	
		300-399	0.054 ^b	1.8	NS		NS		NS	
		400-499	NS		NS		NS		0.148 ^b	1.8
		500-599	0.168 ^b	3.4	0.300	2.4	0.358 ^b	1.8	0.240	2.0
		600-699	0.189	2.5	0.208 ^b	2.4	0.314	2.5	0.318 ^b	1.9
		700-799	NS		NS		0.414 ^b	3.0	0.239 ^b	2.5
		800-899	NS		NS		0.294 ^b	2.3	NS	
	Q4	100-199	0.061 ^b	1.4	NS		0.046 ^b	1.2	NS	
		200-299	0.027 ^b	1.7	NS		0.036 ^b	1.3	NS	
		500-599	0.408 ^b	1.7	NS		0.462 ^b	1.5	NS	
		600-699	0.345 ^b	1.7	NS		NS		NS	
		700-799	0.225 ^b	1.6	NS		NS		NS	
		800-899	NS		NS		0.298 ^b	2.8	NS	

Table 8.--Continued.

		INPFC Area								
Year and quarter	Depth (m)	Shumagin		Chirikof		Kodiak		Yakutat		
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	
1981	Q1	100-199	0.024	1.6	0.008	1.5	NS		NS	
		200-299	0.137 ^b	1.9	0.037	1.9	NS		NS	
	Q2	100-199	0.052	1.9	0.022	1.8	0.035 ^b	1.4	NS	
		500-599	0.175 ^b	2.2	0.568 ^b	1.8	NS		NS	
		600-699	NS		0.501 ^b	1.6	NS		NS	
		700-799	0.198	2.1	NS		NS		NS	
	Q3	100-199	0.047	1.7	0.051	1.7	0.133	1.6	NS	
		200-299	NS		0.205 ^b	2.1	NS		NS	
		500-599	0.336 ^b	2.6	0.528 ^b	1.9	0.570 ^b	2.8	NS	
		600-699	0.249 ^b	2.3	0.315 ^b	2.5	NS		NS	
		800-899	0.220 ^b	2.8	NS		NS		NS	
	Q4	100-199	0.154	2.0	0.218	1.9	NS		NS	
		200-299	0.136 ^b	1.9	0.142 ^b	2.0	0.032 ^b	2.5	NS	
		500-599	NS		NS		0.875 ^b	2.0	0.270 ^b	2.1
		600-699	0.269 ^b	1.6	0.402	2.0	0.424	2.1	0.171 ^b	1.4
		700-799	0.225 ^B	1.7	NS		NS		0.200 ^b	2.2
1982	Q1	100-199	0.006	2.0	<0.001	1.2	0		NS	
		200-299	0.024	2.1	0.007 ^b	2.7	NS		NS	
	Q2	100-199	0.002 ^b	1.3	0.001	0.7	0.007	1.3	0.003 ^b	0.5
		500-599	0.106 ^b	1.4	0.074 ^b	2.7	NS		NS	
		600-699	0.510 ^b	2.1	0.466 ^b	1.9	NS		0.407 ^b	1.4

Table 8.--Continued.

		INPFC Area									
Year and quarter	Depth (m)	Shumagin		Chirikof		Kodiak		Yakutat			
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.		
1982	Q3	100-199	0.011 ^b	2.6	0.070	1.6	0.243 ^b	2.0	NS		
		200-299	0.201 ^b	2.4	0.138	2.4	NS		NS		
		400-499	0.595 ^b	2.0	NS		NS		NS		
		500-599	0.599 ^b	1.9	NS		NS		0.619 ^b	3.0	
		600-699	0.466 ^b	2.3	NS		NS		0.547 ^b	2.3	
	Q4	100-199	0.072	2.1	0.076	1.6	0.022	1.5	NS		
		200-299	0.138 ^b	2.4	0.003 ^b	0.7	NS		NS		
		400-499	0.336 ^b	2.0	NS		NS		NS		
		500-599	0.595	2.1	0.529	1.9	0.672	2.1	0.456 ^b	2.7	
		600-699	0.497 ^b	1.9	0.534 ^b	2.0	0.593 ^b	2.1	NS		
		800-899	0.334 ^b	2.0	0.318 ^b	2.3	NS		NS		
	1983	Q1	100-199	0.003	2.3	0.001	0.9	0.011 ^b	1.0	NS	
			200-299	NS		0.001 ^b	1.1	NS		NS	
		Q2	100-199	0.012	1.4	0.004 ^b	1.0	NS		NS	
200-299			NS		0.057	2.0	0.079 ^b	2.7	NS		
400-499			0.518 ^b	1.9	0.424 ^b	2.0	NS		NS		
500-599			0.392	2.3	0.454 ^b	1.9	0.293 ^b	2.7	NS		
600-699			0.510 ^b	1.9	0.400 ^b	2.1	0.305 ^b	1.9	NS		
Q3		100-199	0.161	2.0	0.053	1.9	NS		NS		
		200-299	NS		0.091	2.5	NS		NS		
		400-499	0.422 ^b	2.4	NS		NS		NS		
		500-599	0.397 ^b	2.6	NS		0.429 ^b	2.2	NS		
		600-699	NS		NS		0.334 ^b	2.8	NS		

Table 8. --Continued.

Year and quarter	Depth (m)	INPFC Area							
		Shumagin		Chirikof		Kodiak		Yakutat	
		CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.	CPUE	Av. wt.
1983 Q4	0-99	0.006 ^b	2.6	NS		NS		NS	
	100-199	0.084	2.1	0.060	2.0	0.061 ^b	2.0	NS	
	200-299	0.373	2.3	0.085	2.0	0.188	2.3	0.044 ^b	1.8
	300-399	0.202 ^b	2.2	NS		0.199 ^b	2.6	NS	
	500-599	0.233 ^b	2.4	NS		0.525 ^b	2.6	0.484 ^b	2.4
	600-699	0.401 ^b	2.4	NS		0.688 ^b	2.0	0.466	2.3
	700-799	NS		NS		NS		0.396	2.3

^a NS = No sample

^b Relatively small sample

Source: U.S. observer data provided by Jerald Berger, Resource Ecology and Fisheries Management Division, Northwest and Alaska Fisheries Center, 7600 Sand Point Way NE, Bin C15700, Bldg. 4, Seattle, WA 98115.

REFERENCES

- Berger, J., J. Wall, and R. Nelson, Jr. 1984. Summary of U.S. observer sampling of foreign and joint-venture fisheries in the northeast Pacific Ocean and eastern Bering Sea, 1983. Unpubl. rep., 211 p. Northwest and Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, 2725 Montlake Blvd. E., Seattle, WA.98112. (Document submitted to the annual meeting of the International North Pacific Fisheries Commission, Vancouver, B.C., Canada, October 1984.)
- Low, L. L. and J. Akada. 1978. Atlas of groundfish catch in the northeastern Pacific Ocean, 1964-1976. Unpubl. rep., 546 p. Northwest and Alaska' Fish. Cent., Natl. Mar. Fish. Serv., NOAA, 2725 Montlake Blvd. E., Seattle, WA 98112.
- Nelson, R. Jr., J. Wall, and J. Berger. 1983. Summary of U.S. observer sampling of foreign and joint-venture fisheries in the northeast Pacific Ocean and eastern Bering Sea, 1982. Unpubl. rep., 224 p. Northwest and Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, 2725 Montlake Blvd. E., Seattle, WA 98112. (Document submitted to the annual meeting of the International North Pacific Fisheries Commission, Anchorage, Alaska, October 1983.)
- Smith, G. B, R. S. Hadley, R. French, R. Nelson, Jr., and J. Wall. 1980. A summary of productive foreign fishing locations in the Alaska region during 1977-79: longline fisheries. Univ. Alaska, Fairbanks, Alaska Sea Grant Program, Sea Grant Rep. 80-1, 180 p.

- Stauffer, G. D. 1985. Sablefish. In R. L. Major (editor), Condition of groundfish resources in the Gulf of Alaska region as assessed in 1984, p. 35-68. U-S. Dep. Cormner., NOAA Tech. Memo. NMFS F/NWC-80.
- Wall, J., R. French, and R. Nelson, Jr. 1980. ,Observations of foreign fishing fleets in the Gulf of Alaska, 1979. Unpubl. rep., 78 p. Northwest and Alaska Fish. Cent:, Natl. Mar. Fish. Serv., NOAA, 2725 Montlake Blvd. E., Seattle, WA **98112**. (Document submitted to the annual meeting of the International North Pacific Fisheries Commission, Anchorage, Alaska, September **1980**..)
- Wall, J., R. French, and R. Nelson, Jr. **1981**. Observations of foreign fishing fleets in the Gulf of Alaska, **1980**. Unpubl. rep., 59 p. Northwest and Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, 2725 Montlake Blvd. E., Seattle, WA **98112**. (Document submitted to the annual meeting of the North Pacific Fisheries Commission, Vancouver, B.C., Canada, September **1981**.)
- Wall, J., R. Nelson, Jr., and J. Berger. **1982**. Observations of foreign fishing fleets in the Gulf of Alaska, **1981**. Unpubl. rep., 72 p. Northwest and Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, 2725 Montlake Blvd. E., Seattle, WA **98112**. (Document submitted to the annual meeting of the North Pacific Fisheries Commission, Tokyo, Japan, October **1982**.)
- Wespestad, V., R. Nelson, and B. Gibbs. **1982**. Distribution of groundfish catches of the foreign trawl and longline fisheries in the eastern Bering Sea and Gulf of Alaska, **1977-80**. U.S. Dep. Commer., Tech. Memo. NMFS F/NWC-31, 143 p.

Zenger, H. H., Jr. **1985**. Pacific cod. In R. L. Major (editor), Condition of groundfish resources in the Gulf of Alaska **region** as assessed in 1984, p. 69-99. U.S. Dep. Commer., **NOAA** Tech. Memo. NMFS F/NWC-80.